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## INTRODUCTION/PREFACE

### PURPOSE OF THIS E-BOOK

Over the past 50 years, we have witnessed a revolution in how technology has affected teaching and learning. Beginning in the 1970s with the use of television in the classroom, to video conferencing in the 1980s, to computers in the classroom in the 1990s, to the social media technologies of today, advances in information technology are affecting how students learn and how faculty teach. Indeed, recent research suggests that information technologies may be both beneficial and harmful to how students learn. Some findings (e.g., Green & Bavelier, 2012) suggest that today's students have improved visual-spatial capabilities, reaction times, and the capacity to identify details among clutter but show a decline in attention and critical thinking compared to yesterday's students. Thus, the challenge for faculty is to determine which technology to employ so that it will facilitate learning for students. This is no small feat as each new wave of advancements in information technology has produced an ever-increasing variety of tools from which to choose.

The idea for this text developed from conversations among the editors and from our experiences using different technologies inside and outside the classroom to facilitate students' learning. Our goal was to create a compendium that presented an array of tools used by faculty that would be an accessible resource for those who are interested in selecting the most appropriate technology that will facilitate learning for their students.

### ORGANIZATION OF THE BOOK

The book consists of 30 chapters that describe a wide array of technologies that faculty have used in their teaching. The text is divided into three sections: Part 1 explores how technology is reshaping human cognition; Part 2 discusses a variety of educational technologies that are used to teach students; while Part 3 presents social media technologies that can be used to engage students in learning.

We lead off with an overview of the eBook by Mark Kavanaugh. In his chapter, Kavanaugh reminisces about the change from chalkboards to whiteboards as an analogy to the continuous changes occurring in regard to technology and its applications to instruction. Taking a cultural viewpoint on these trends, this chapter explores the impact of technology on classroom norms and expectations. These changes are not only driven by innovative instructors, but also by other stakeholders such as school administrators and IT professionals. In the end, the technology must accomplish the goals set forth by the teacher. This can only be done through a well-thought-out application of the technology in the classroom by a teacher who understands both the strengths and limitations of the innovation. The author introduces the reader to Kranzberg's Six Laws of Technology, summarizes the content of the entire book, and leaves would-be technology adopters with some hard-learned advice for exploring the wonderful, and challenging, world of instructional technology in their own classrooms.

In the next chapter, Littlefield and Gjertsen discuss working memory and learning. Working memory is a critical cognitive function that guides and supports learning. Littlefield and Gjertsen define working memory and discuss five teaching techniques that stimulate and enhance working memory processing. These techniques include (1) avoiding information overload, (2) encouraging handwritten notes, (3) intentionally organizing content while learning, (4) teaching students how to wisely search the Internet, and (5) instructing students to practice retrieving newly-learned information. To promote the continued quest for the most effective teaching and learning techniques, the chapter closes with recommendations for future research. While it appears that both digitally-based and



traditional teaching methods activate working memory, further exploration is needed to better understand how technology impacts brain structure and working memory functioning.

Deborah Gagnon, in Chapter 3, examines the problem of ubiquitous distraction that our digital devices serve up and the propensity toward multitasking that ensues. Both detract from the focused attention and deep processing of information that learning requires. What can we do to discourage distraction and multitasking in our students? An alternative view of attention – Lin’s (2009) narrow- versus breadth-biased focus – is described. Pedagogical suggestions that ensue fall under the categories of Respite, Discipline, Balance, and Mindfulness. A final list of Best Practices that instructors can adopt for encouraging focused attention and deep processing are provided.

In Chapter 4, Bethann Bierer presents a discussion about a possible downside to the use of technology in the classroom. Using information gleaned from several developmental and educational theorists, she builds a case that using technology to over-scaffold learning tasks may not always be in the students’ best interests. She suggests that not only should individual educators think carefully about the learning supports they provide students, but that departments should develop consistent models for removing scaffolds as students move through their program. The aim of this process should be to help students develop the personal attributes that will support their future success in addition to helping them master important material and skills.

Mandy Hall and Tara Lineweaver discuss multi-tasking in Chapter 5. They first review the literature on the prevalence of media multi-tasking in the classroom, and then examine the empirical evidence regarding the effects of media multi-tasking (mobile phone use and laptop use) on student learning. They conclude their chapter by offering suggestions for approaches instructors can use to diminish the prevalence of media multi-tasking and its negative effects in their classrooms.

In Chapter 6, Darren Iwamoto and Jace Hargis identify technological challenges with which 21<sup>st</sup> century teachers are faced. This chapter addresses a simple yet complex question which is, how do we keep students engaged in the here-and-now of our classroom? Iwamoto and Hargis suggest that one solution is the incorporation of student response systems (SRS), which has been shown to engage students and teachers in real-time. This real-time interaction between teacher and students increases learning by keeping students in the here-and-now, which is the only time the act of learning can take place. Because students find SRSs to be engaging, they allow themselves to be present and in the moment. This mindful act quiets mind wandering and promotes learning in a fun and engaging manner.

Sarah Elaine Eaton examines the impact of technology on teaching and learning in Chapter 7. Eaton addresses challenges teachers face when learning how to use technology in their classrooms. These include using the technology in ways that are pedagogically sound and meaningful for learning, addressing increased demands on time and tackling technology barriers beyond the teacher’s control. The author then goes on to address the impact of technology on student learning, examining active learning through content creation and preventing cognitive overload. Eaton concludes by contending that as technologies advance it is likely that teachers will continue to be challenged to master new learning tools, such as virtual reality, to advance student learning, asserting that teachers will need to be responsive and adaptive as technology evolves.

In Chapter 8, Barbara Brown and Norman Vaughan use Friesen’s (2009) five principles of teaching effectiveness as a framework for designing group work in blended learning environments. The authors draw on their experiences in designing, teaching and conducting research in post-secondary education courses as well as assumptions about participatory cultures to provide detailed examples and images from in-class and online learning activities. Ten

recommendations are offered to help instructors design blended learning environments that meaningfully incorporate technologies to promote collaboration and group work.

In Darrell Rudmann's chapter, he describes recent research on hybrid or "blended" course formats. Empirical evaluations of student learning effectiveness of blended formats is mixed, but the rigor of much available research is lacking. Meta-analyses tend to find small but positive results of using the format, in line with fully online courses, an effect that seems present when online resources are provided and students work collaboratively. Common student and faculty perceptions of the format include concerns over communication and an increased reliance on instructional resources. To help those considering migrating a course to a hybrid format, the chapter closes with a discussion of the known challenges involved in understanding when and why the format works.

In chapter 10, Natalie Milman describes what asynchronous online discussions are and how they promote student-student, student-instructor, and student-content interactions in asynchronous online and blended education courses in institutions of higher education. Milman shares some of the most popular technology tools for hosting asynchronous online discussions and introduces numerous benefits that instructors and students might experience when incorporating asynchronous online discussions. Milman also outlines various challenges stakeholders may encounter incorporating asynchronous online discussions, as well as several best practices to mitigate and better structure asynchronous online discussions.

In their chapter, Michael Stevenson and Damien Michaud describe strategies and techniques that can be deployed to increase student-content, student-student, and student-instructor interaction and engagement in asynchronous, online courses. These approaches include: Providing immediate feedback to students responding to machine-scored, multiple-choice questions; encouraging students to attempt assessments multiple times; graded discussion threads; graded peer feedback on course artifacts; weekly announcements; instructor commentaries; and participation monitoring. By focusing on the elements of the dynamic, triadic relationship between the instructor, the student, and the content, the authors identify approaches and applications of sound pedagogy and effective technologies that increase engagement for students, even in high enrollment, asynchronous, online courses.

Jessica Cerniak provides an overview of learning management systems (LMSs) used to deliver online courses in higher education in Chapter 12. The author explores various features and functions of current LMSs and how these aid student learning, faculty's teaching and management, and program development and oversight in closed enrollment courses that are part of degree-granting programs. The chapter concludes with a discussion of some challenges encountered by, and recommendations for, all users of LMSs.

After 30 years of teaching high school in a traditional classroom, a veteran teacher transitions to a full-time online teaching model. In Chapter 13, Michael Munson offers insights gained from his experience in a synchronous distant learning setting for high school students. He presents specific strategies to promote student engagement in online learning by focusing on ways to get the most from a learning management system (LMS) so that it becomes a tool for growing student engagement, attention, and organization talents. He also explains practical ways to incorporate other technology systems including Google Classroom, video conferencing, and digital white boards that are becoming increasingly common American education.

Open Educational Resources (OER) are materials licensed in a way that allow faculty to use, modify, and adapt them for teaching psychology and other courses. In Chapter 14, Anton Tolman and Seth Gurell note that most faculty express concerns about the cost of commercial content to students, but relatively few are taking advantage of OER

despite growing evidence of equivalent or higher quality and significant benefits to student motivation and learning outcomes. They review factors that influence faculty decisions whether to use OER as well as student reactions to these materials, which are mostly positive. Tolman and Gurell also provide a personal perspective on curricular integration and customization of OER in an Introductory Psychology course and describe the likely future of these materials as part of a growing emphasis on open pedagogical practices.

In Chapter 15, Philip Jefferies recounts experiences in Fiji to highlight some of the challenges involved in teaching within lower-resourced environments. Reflecting on his time teaching students across the Pacific Island nations, where access to technology and learning resources cannot be taken for granted, he discusses alternative approaches to supporting learning that may be beneficial in other resource-constrained regions.

In chapter 16, Amy Hebert Knopf, Elise Knopf, Steve Anderson and Wally Waranka provide information on making online platforms accessible for students with disabilities. While the information presented is focused on inclusive environments and equity access for students with disabilities, the principles benefit all learners. The underpinnings of Universal Design in Learning are applied to course design and curriculum pedagogy. Practical examples are provided that span across learning management systems. The authors introduce unique considerations for some disability categories and provide resources.

In Chapter 17, Diana Milillo and Adam Pilipshen review examples of easily accessible and affordable digital tools to create and manage course content. These tools may be used by instructors and students to create presentations, videos, or assessments embedded into a digital format. Further, because of the accessibility of these tools, instructors and students have many options for interactions – either as graded or collaborative work or to facilitate informal discussions. The authors provide a short, guided discussion on the basic functions of several digital tools and how they might be best used for pedagogy.

Kimberly Christopherson, in Chapter 18, discusses how the use of mobile devices (e.g. smartphones, tablets) has become ubiquitous with many people using their mobile devices to conduct their daily business without needing to actually enter the physical space of that business (e.g. online banking, shopping, information seeking). With more people having access to mobile devices, how might mobile devices and a mobile-first design be incorporated into higher education and what are the potential benefits and drawbacks to having students use mobile devices in the classroom? This chapter explores several strategies that faculty might use to effectively and meaningfully incorporate mobile devices into their classrooms to help increase student engagement while minimizing the potential for these devices to be distracting.

In Chapter 19, Kara Sage reviews the current literature on e-books, with a particular focus on postsecondary education. This chapter opens with a discussion of current trends in e-book use and why it is an important topic for educators to consider. Students today often have multiple screens at their fingertips, and, accordingly, e-book availability and use are on the rise. The advantages and drawbacks of utilizing e-books are evaluated, and the literature comparing e-books to traditional paper textbooks is reviewed. A variety of factors regarding e-book design and adoption are discussed, to provide recommendations to instructors and publishers. Ultimately, e-books can be a valuable resource for students and offer some unique benefits beyond print books, but their status as a viable alternative for print books is still somewhat questioned.

Melissa Beers and Nicole Kraft discuss digital competency in Chapter 20. They argue that students bring multiple devices into the classroom, but they do not necessarily bring the digital skills to use those tools for academic good.

Their chapter discusses how the “digital native” myth may be a barrier to skill development. Technology is an integral part of students’ lives, one that instructors can leverage as a tool for learning by integrating training and support in our courses. Beers and Kraft suggest strategies to help students view technology as a resource for learning, motivate them to use it creatively, and develop skills that will benefit them long after graduation.

In Chapter 21, Natalie Homa describes the simulation program, MyVirtualChild, and highlights its usefulness in developmental psychology courses. The program, which provides students the ability to raise a virtual child from birth to 18-years-old, has qualities of an effective experiential learning tool. A review of the existing empirical data examining the program’s positive impact on learning is provided. Homa also describes possible challenges instructors face such as technology difficulties, student concerns, and course implementation decisions. Finally, she provides recommendations for the successful integration of MyVirtualChild into one’s classroom.

In their chapter, Richard Harnish and K. Robert Bridges present an overview of GoAnimate4Schools, an animated video platform that can provide students with an opportunity to engage in course material, share ideas, solve problems and demonstrate competency. After walking readers through each step of creating an animated video, the authors discuss the benefits and drawbacks of GoAnimate4Schools from both student and faculty perspectives.

In his chapter, Gary O’ Reilly describes how we can custom design computer games and apps to better educate young people about the complex concepts of effective mental health interventions such as Cognitive Behaviour Therapy (CBT). He illustrates this with a CBT computer game and smartphone app called *Pesky gNATs*. *Pesky gNATs* is designed to blend ideas from CBT, clinical psychology, developmental psychology and learning theory with technology to provide an effective de-stigmatising therapy experience for young people. The *Pesky gNATs* computer game is played in-session by a young person and his/her therapist to learn how to personally apply CBT concepts for the management of anxiety and depression. The *Pesky gNATs* app allows young people to transfer what they learn in therapy to their home school and community life.

In chapter 24, Michelle Miller and John Doherty present an approach to addressing digital distraction using an online instructional module that draws on video and interactive demonstrations to vividly illustrate the limitations of attention. Psychology, as a discipline, is well positioned to address the issue of distraction, but simply covering the relevant research as part of introductory and cognitive classes may be insufficient to produce the desired impacts on attitudes and beliefs about attention. The *Attention Matters!* module developed at Northern Arizona University can be assigned as extra credit in a wide range of courses. At this institution, over 2,000 participants have enrolled in it, with approximately 75% completing the full module. Open-enrollment online modules emphasizing multimedia and interactivity are a way to disseminate research findings about attention outside of the traditional psychology curriculum, thus encouraging students to make better choices about how they manage their personal technology.

Lindsay Phillips, Jill Marron, Chris Kichline, Christina Fogle, and Ellen Pillsbury, in Chapter 25, discuss the value of service learning in psychology and present recent literature on how technology can be used to incorporate service learning, both in online courses and in traditional courses where more flexible service learning opportunities may be desired. Authors discuss both face-to-face service learning in online coursework and service learning projects that occur entirely online. Authors provide suggestions and resources for online serving learning and conclude that technology may increase implementation of this valuable pedagogical tool.

In the chapter “Always in Style: Using Technology Tools to Help Students Master APA,” Maria Zafonte aims to address the frustration many instructors have with their students’ struggles to submit papers that are correctly formatted according to the guidelines in the *Publication Manual of the American Psychological Association*. Zafonte examines ways to incorporate technology tools into the classroom to aid students’ understanding of and facility with APA Style. Ranging from conventional tools such as Microsoft Word to online sharing applications such as Padlet or Pinterest, the chapter provides resources that will make acquiring correct documentation skills easier and more engaging for students.

In Chapter 27, Lauren Stutts specifically addresses the use of personal response systems (i.e., clickers) in the classroom. The effectiveness of personal response systems and why they work are discussed. The author also describes how to use a personal response system, Socrative, in the classroom to collect attendance, to engage in formative assessment, to conduct anonymous polls, and to administer formal quizzes/surveys. Ultimately, integrating technology in the classroom is highly valuable as our society will likely become increasingly dependent on it for work and daily functions.

Stephen Blessing, Bethany Fleck, and Heather Hussey discuss the ways in which blogs have been used in higher education classrooms in Chapter 28. Three types of blogs are considered: Traditional blogs, micro-blogs, and photoblogs. Traditional blogs contain paragraph-long discussions between students. Micro-blogs (e.g., Twitter) allow for short communications to be relayed, and photoblogs let students post relevant pictures to a social media stream. In addition to considering the pedagogical reasons for using these kinds of blogs in classrooms, the authors also analyze the empirical findings that instructors and researchers have discovered in their courses. They close with a short list of considerations for instructors who may want to use blogs in their classrooms.

In Scott King and Mark Chan’s chapter, they provide an overview of existing literature about the use of Twitter in class curricula, present an empirical study of the effects of Twitter on student engagement and academic performance in Introductory Psychology, and discuss challenges and lessons learned from their experiences. The authors performed a quasi-experiment across four semesters (two academic years) of teaching the course, with each author teaching two sections requiring student Tweets as a course component, and two sections taught traditionally without Twitter. While student engagement and academic performance were unaffected by incorporating Twitter, small but notable correlations provide avenues for future research.

In Chapter 30, Jennifer Ann Morrow, Lisa Shipley, and Stephanie Kelly discuss the benefits of using the PechaKucha presentation style in the college classroom. The authors describe how this fast-paced, interactive presentation style can be utilized by both instructors and students. The benefits and challenges of using this presentation method are presented as well as suggestions for how instructors can incorporate PechaKuchas in their classrooms. Helpful tips for what to do and what not to do are summarized and a list of resources and examples are also provided within the chapter.

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## REFERENCES

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We want to thank our authors for their generous and thoughtful contributions to this e-book. In each chapter, the authors have shared their insights into how the technology was used, the challenges, as well as the rewards, experienced, and recommendations for adopting specific tools. Our hope is that the reader will find the text to be a practical introduction the technologies available to faculty and students in meeting their learning goals.

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March 2018



# WHAT TO EXPECT IN THIS COMPENDIUM

# THE IMPACT OF TECHNOLOGY ON TEACHING AND LEARNING: DOES ANYONE MISS THE CHALKBOARD?

MARK H. KAVANAUGH KENNEBEC VALLEY COMMUNITY COLLEGE

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## WHAT HAPPENED TO THE CHALKBOARD?

One of my most fond memories of high school was my Geometry class. I was not good at all the subjects I took in high school, but I was good at Geometry. Part of this was due to a love of drawing and structures, but in equal measure, it was due to my teacher. Mr. Tom Kelly was an interesting person and an energetic teacher. To this day, I strive to model my own teaching after his enthusiasm and charisma and I hope I do him justice!

Mr. Kelly's classroom was like any typical high school classroom with small chairs/desks (those seats that had a partial desk incorporated into the design created by some designer who apparently skipped the ergonomics classes in design school) and a huge chalkboard spanning the entirety of one wall from the windows on one side to the American flag and pencil sharpener on the other. This chalkboard was, to Mr. Kelly the canvas upon which he portrayed ideas, images, formulas, lines, angles, circles, and the occasional polyhedron in stark white chalk.

As he spoke, Mr. Kelly counted a quick staccato rhythm to his words as his chalk would CLICK against the surface and SCRATCH new additions to his masterpiece of the day. To me, it seemed almost like an opera, with the words (sometimes seeming to be in a different language, just a like a real opera!) erupting into the room to the sharp rapport of drums (CLICK) and cymbals (SCRATCH) in a musical drama titled *Pythagoras* by some composer of the era of Mozart. Being one of those who often wanted to add my own harmonies to the symphony, I often spoke out of turn, whispered to my friends, and generally goofed around in a manner which I felt added color to the music. To this, Mr. Kelly, conductor, would add a poignant kettle drum part. Mr. Kelly could hit me in the head with a chalk infused eraser from any point in the room, and he often felt the need to do so.

Jump forward a few decades and I found myself standing in front of a chalkboard in my own classroom. I had gone on to college (for way too long) and found myself teaching Psychology at a local community college (something I have been doing for 20 years now, possibly, also, way too long!) In an attempt to replicate Mr. Kelly's masterful teaching style, and the masterful styles of many other teachers and mentors I had experienced along the way, I beat my chalk against the black surface in time with the outpouring of my ideas. I sometimes did not even write anything of any specific value or relevance, a circle, an arrow, something that punctuated an idea that I could only release if it was accompanied by that CLICK and SCRATCH. I never threw erasers at my students (I only wanted to), but I do believe I may have engaged some of them as much as I was engaged by Mr. Kelly.

Soon, however, a new technology was about to take hold of the classroom. This technology was supposed to play a part in the transformation of higher education and make learning more engaging and teaching more energized. The chalkboard was being replaced by the whiteboard. Someone got it into their head that markers of a splendid variety of colors applied to a shiny white surface would create a better (if not at least, less chalk dust-filled) learning experience for all. After all, one could use different colors to emphasize differences in concepts, ideas, and thoughts.



And, if one applied the correct method of erasing and cleaning the surface, the gleaming whiteboard could be returned to its original pristine state for the next thought, concept, or class. Unlike the chalkboard that I was often obliged to clean with soap and water after school because of my numerous attempts to add my own music to the classes I attended. The whiteboard was new, and shiny, so it was better, right?

The classroom I was teaching in was the last classroom that had not been impacted by this new technology. I loved my chalkboard. I liked the sounds it made when I was writing and how it played a part in my thinking and processing of ideas. It may even have played out to some of my students the same way it did to me when I was in high school; the staccato rhythm accompanying a dynamic lecture. Then it happened. Despite my insistence that I wanted to keep my chalkboard, it was taken off the wall and replaced by a shiny new whiteboard. I approached this soul-less surface armed with a box of “markers” which were bright and colorful but, for some reason, seemed less alive. They did not even smell like different fruits like the last set of markers I had owned, I checked. I mean, should not the orange marker smell like an orange? Technology moved forward and I was dragged along. I still miss the chalkboard. The quite “dab” and “streak” sounds made by my scent-challenged markers has never really been a match to the “CLICK” and “SCRATCH” of my chalk.

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## TECHNOLOGY, CULTURE, AND INSTRUCTIONAL PROBLEMS

According to the Merriam-Webster dictionary ([www.merriam-webster.com](http://www.merriam-webster.com)), technology may be defined as “the practical application of knowledge especially in a particular area.” In its broadest sense, the term technology, when applied to education, includes the skills, practices, and procedures of instruction itself. These would be the evidence-based teaching practices that teachers use in the classroom. In fact, one might say that the classroom culture is made up of all the practices, expectations, and technology (including non-material and material technology) within the classroom environment.

The relationship between culture and technology is a complex one. Since technology is a part of this culture, it both shapes and is influenced by each of the other elements in the environment. The relationship is reciprocal. Innovators within a culture produce solutions to these problems; however, once this solution appears, it has an active impact on the culture itself. New technology, in many cases, becomes the new “normal.” Anyone who has witnessed the birth and growth of the mobile phone market can attest to how a technology that was once new and relatively trivial has become a common expectation. How many people do you know who do NOT have a mobile phone?

According to the American Sociological Association, “Culture (is understood as) the languages, customs, beliefs, rules, arts, knowledge, and collective identities and memories developed by members of all social groups that make their social environments meaningful” (<http://www.asanet.org/topics/culture>). Culture surrounds and permeates our surroundings and our mind in ways that are so immersive that we can be quite unaware of it until we find ourselves in the presence of an alternative culture much different than our own. Our own norms, values, and expectations for how the world works. This conception of how the world works, which we carry around with us is identified by C. W. Mills (1959) in his book *The Sociological Imagination*. According to Mills, this internal construction of reality can be challenged when we encounter different imaginations of how the world works that are different from our own.

Education is a cultural institution in which this reciprocal interaction between the culture of education and technology has been profound and transformative. Modern institutions of education face challenges and problems.

While there has been no shortage of new teaching and learning theories, innovative pedagogical practices, even new brain science knowledge, we would be remiss to think that technology, particularly computer and communication technology, has been at the forefront of education transformation.

My personal story about the loss of my chalkboard demonstrates how changes in technology bring about changes in our culture and in our behavior. In this instance, it had an impact on my classroom. At times, this can come upon us when we do not expect it, and we may not welcome it. The school, in my case, was shifting to a new technology and I simply had to go along with it. At other times, we can be at the forefront of the wave of change, not only welcoming technology into our practice, but also becoming leaders in our schools and professional communities.

I survived to thrive in the new era of whiteboards, but it was not without a transformation in myself. While it may seem a minor issue, I truly miss the chalkboard and I had to change how I taught classes; both, to transform the good teaching practice I had been doing into this new medium, and to take advantage of the pedagogical doors that had been opened by the whiteboard.

Throughout history, teachers have encountered what we may call “instructional problems.” Technology, both the physical tools and methods we use in employing these tools have been called upon to solve these instructional problems. The chalkboard now makes a very suitable example of this process. According to [www.slate.com](http://www.slate.com), the use of cheap, erasable slates to practice reading, writing, and math have been around for centuries. However, it was not until some innovative teachers, early in the 1800s, connected several slates together into a larger surface that the concept of the modern chalkboard emerged in our culture.

The promise of the chalkboard was apparent. Teachers could write and draw words and diagrams to support their oral presentations to relatively large groups of learners. The chalkboard was simple, effective, erasable, reusable, and cheaper than paper and ink for the purposes it was created. Implementation of chalkboards into classrooms was rapid. The chalkboard provided a form of textbook, a blank page, a laboratory, and probably most importantly, a focus of student attention. The promise of today’s instructional technology builds on these same expectations. We want our newer technology to be a form of textbook, a blank page, a laboratory, and a focal point for students’ attention.

Not only do we live in a time of rapid change in information, computer, and communication technology, we live in a time where the adaptation of these technologies to education is a primary strategy to address the variety of instructional challenges and problems that we face across the entire education industry. We are living in a new age of *Positivism* where we turn toward scientific methods, measurement, invention, and technological innovation as the primary means by which we address our questions and problems. While our politics may vacillate between being pro-science and not, the populace generally feel our future is in the good hands of forward thinking innovators and scientists, and I agree. In the presence of a problem, science and technology present fantastic tools to explore and create solutions.

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## ADOPTING TECHNOLOGY

Another important factor about the impact of technology on education is to consider both the adoption and diffusion of new innovations. According to Straub (2009), adoption and diffusion of technology is influenced by many factors. Despite many technological advances being made at higher administrative levels within schools, individual adoption by teachers can be mapped over time and used to identify those who may be considered “early”, “mid”, and “late

adopters.” Many readers of this book may be categorized as “early adopters” of technology in the classroom. Possibly, some of you are ever ready to try new things, easily bored, and in possession of a highly developed “risk-taking” personality. Many of you are attracted to the promise that technology brings to the pedagogical table. New ways of interacting with students, redefined methods of presenting materials, the possibilities of social interactions with individuals through advanced communication tools, and innovative ways of measuring learning may catch your eye. Reading about these emerging technologies you may often say... “I could use that in my class!” Consider this example:

At the time of this writing, Apple has released its flagship iPhone X. One interesting feature of the device is its ability to animate emoji. Emoji are tiny icons, graphics, and characters than many users of social media insert into their messages to emphasize and compress thoughts and ideas. Emoji are like Emoticons; those little emotionally-laden characters we use like the sideways “smiley” face.

:-) = happy      :-D = very happy      :-( = sad

Emoji, however, are artfully created and cover a vast array of symbols representing faces, animals, flags, food, jobs, and everyday objects.

Apple has introduced the ability to animate these emoji in their product called Animoji. With high definition camera and the A11 Bionic processor at hand, the user of the iPhone X will be able to animate 12 different animoji to mimic the facial expressions of the user! The animoji will mimic and animate the facial features of the user quite accurately. Does anyone see how this could be used in a Psychology class exploring facial features and the recognition of emotions? Could we apply this to teaching kids on the Autism Spectrum to recognize subtle changes in facial features and their meaning? Apple only wanted to create a new spin on emoji and here we are looking for ways to incorporate it into our classroom. (Yes, we can also use it to communicate real feelings about our students’ work!) This is what happens! New technology emerges, and we begin to get creative about how we might enhance learning experiences with it! It changes, we adapt.

Technology has not failed to keep its promise. There is no doubt that interaction between the worlds of technology innovation and education have produced new and innovative methodologies for teaching and learning. These results, however, have not been without their challenges. Technology has both solved and created instructional problems. However, as psychologists and teachers of psychology, it is not enough that a particularly technological innovation is popular, innovative, fun, or promising. It must work. To satisfy us, the technology that we embed into our classrooms must meet a particular, though not often measured and researched, “return on investment,” or ROI. By this we infer that the amount of investment of time, money, energy, support, and frustration is a cost that is “reasonable” in relation to the pedagogical outcome. Essentially, do the benefits outweigh the costs?

It may be informative at this point to introduce the reader to Melvin Kranzberg. In 1985, Dr. Melvin Kranzberg, the founding editor of the academic journal *Technology and Culture*, delivered the presidential address at the annual meeting of the *Society for the History of Technology*. In this address, Kranzberg outlined a number of truisms about the unique and impactful relationship that technology has on culture. His focus was to provide a balanced perspective on the doctrine of technological determinism, namely that technology is the primary driving force in “shaping our lifestyles, values, institutions, and other elements of our society” (Kranzberg, 1985). In light of how technology in impacting education, it is useful to examine these impacts through these different lenses.

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## KRANZBERG'S SIX LAWS OF TECHNOLOGY

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### LAW #1: TECHNOLOGY IS NEITHER GOOD NOR BAD; NOR IS IT NEUTRAL.

Technology of all kinds has no minds of its own and is inert outside of the activity of the humans who use it. We may hear this sentiment in the rhetoric regarding gun control where “Guns don’t kill, people do” can be often heard. However, even though it is clear that the impact of the application of technology in the classroom depends on ways in which teachers and students use the technology, it is, as Kranzberg asserts, not neutral. Technology can be viewed as another member of the learning team; the teacher, the student and the technology. Technology, in this manner, will never be completely transparent, at least until the time comes when it is difficult to determine where people end and machines begin.

To this end, we must always perceive technology as an additional barrier to learning, even if it also provides solutions to barriers in learning. The mind engaged with technology has to translate the medium into comprehensible thoughts and processes and integrate these into current cognitive structures of both the concepts being learned, and of the technology itself.

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### LAW #2: INVENTION IS THE MOTHER OF NECESSITY. EVERY TECHNICAL INNOVATION SEEMS TO REQUIRE ADDITIONAL TECHNICAL ADVANCES IN ORDER TO MAKE IT FULLY EFFECTIVE.

We can best understand the application of this law to education if we examine, once again, the broad definition of the term “technology” within the Merriam-Webster dictionary ([www.merriam-webster.com](http://www.merriam-webster.com)), supporting the premise that technology includes the skills, practices, and procedures of instruction itself. These would be the evidence-based teaching practices that teachers use in the classroom.

When we add computer or communication technology into the instructional process, according to the second law, we will need to advance the teaching technology as a result. We cannot engage in the same teaching practices that we have used without specific technology after we have added technology, we have to modify our methods. In fact, we have to advance these methods and practices in order to ensure that the inclusion of technology is “fully effective.”

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### LAW #3: TECHNOLOGY COMES IN BIG AND SMALL PACKAGES. THE FACT IS THAT TODAY'S COMPLEX MECHANISMS USUALLY INVOLVE SEVERAL PROCESSES AND COMPONENTS.

Just as we understand that we will need to change our teaching practices in order to ensure that our technological innovations are “fully effective” we also realize that technology is rarely simple, it often implicates a number of different processes that must be contended with in order for the initiative to work. Consider the simple addition of using email to communicate with students regarding due dates for assignments in a course. While this may seem like a small technical addition to classroom practice it implies a number of processes. Teachers need to create their own email account and deduce a mechanism to isolate student communication from other emails. Students also need to do the same with their email accounts, isolating specific messages about school from other emails. Expectations as to when the emails would be forthcoming from the teacher need to be identified and behavioral habits on the part of the students to check the email need to be maintained. Etiquette and expectations for the use of this communication protocol need to be developed and consequences for infractions need to be outlined. Recipient (mailing lists) need to be developed to make the effort more efficient and mechanisms to add and remove recipients from the email list need to be developed and maintained. Finally, if the emails are a primary means of

communication, alternative methods need to be developed in the instance of lapses in Internet service, device damage and loss, and to further document class expectations. It is remarkable that we implement complex technologies such as Learning Management Systems with an expectation that these additional adjustments will simply manifest themselves.

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**LAW #4: ALTHOUGH TECHNOLOGY MIGHT BE A PRIME ELEMENT IN MANY PUBLIC ISSUES, NONTECHNICAL FACTORS TAKE PRECEDENCE IN TECHNOLOGY-POLICY DECISIONS. MANY COMPLICATED SOCIOCULTURAL FACTORS, ESPECIALLY HUMAN ELEMENTS, ARE INVOLVED, EVEN IN WHAT MIGHT SEEM TO BE PURELY TECHNICAL DECISIONS. TECHNOLOGICALLY “SWEET” SOLUTIONS DO NOT ALWAYS TRIUMPH OVER POLITICAL AND SOCIAL FORCES.**

One interpretation of this law in regard to education may be in our need to enforce the law. In this sense, we should not allow technology to be the sole driving force in educational and instructional decisions. We should not embark on a system where the technological application is driving educational practice but strive to ensure that education practice is driving the technological application.

There are many instances where schools have made intensive investments into technology which is then forced upon teachers in order to justify the costs. Technological innovation in the classroom should be first piloted by enthusiastic early-adopters. This process will ensure a proper vetting of both the benefits and challenges of specific technologies and will help define the alternative instructional practices necessary to ensure success prior to distributing the technology on a broader scale.

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**LAW #5: ALL HISTORY IS RELEVANT, BUT THE HISTORY OF TECHNOLOGY IS MOST RELEVANT. ALTHOUGH HISTORIANS MAY WRITE LOFTILY OF THE IMPORTANCE OF HISTORICAL UNDERSTANDING BY CIVILIZED PEOPLE AND CITIZENS, MANY OF TODAY’S STUDENTS SIMPLY DO NOT SEE THE RELEVANCE OF HISTORY TO THE PRESENT OR TO THEIR FUTURE. I SUGGEST THAT THIS IS BECAUSE MOST HISTORY, AS IT IS CURRENTLY TAUGHT, IGNORES THE TECHNOLOGICAL ELEMENT.**

We have already examined that there is an interaction between culture and technology, yet rarely do we see a revelation of the day-to-day technological innovations that shaped the lives of people in history. Surely it would be nearly impossible to write the history of modern civilization without including copious words on our devices. It would be hard to imagine a modern study of our society failing to mention the important role smart phones and the Internet play in our society and our world view.

While the technologies of the past may have not been as intricate as our modern-day devices, they were equal in their impact on the daily lives of those who used them. It was not that long ago, as many readers of this book could attest, that writing papers for class was done on a typewriter and the concepts of “white out” for correcting small mistakes (and retyping the whole paper for large mistakes!) were part of our everyday language. These technologies may seem quaint but they were tremendous leaps forward for those in the day and they played a major role in the social lives of people.

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LAW #6: TECHNOLOGY IS A VERY HUMAN ACTIVITY – AND SO IS THE HISTORY OF TECHNOLOGY. BEHIND EVERY MACHINE, I SEE A FACE – INDEED MANY FACES: THE ENGINEER, THE WORKER, THE BUSINESSMAN OR BUSINESSWOMAN, AND SOMETIMES THE GENERAL AND ADMIRAL. FURTHERMORE, THE FUNCTION OF TECHNOLOGY IS ITS USE BY HUMAN BEINGS – AND SOMETIMES, ALAS, ITS ABUSE AND MISUSE.

One key point of this law is the recognition that human beings are responsible for the use, and misuse of technology. Behind the creation of the technology can be found individuals. The creators of these technologies can no more refrain from imprinting their personalities into their invention than an artist can paint without embedding their signature styles of stroke and color. As creations of the human mind, they are figuratively, and sometimes literally, created in the image of their creator.

Adopters of the technology, however, are co-creators of the technology. Mindful that the technology is dead when it is not being used, the user embeds the technology with their own personalities through the selective use of specific technologies in specific ways to solve specific problems. The technology is somewhat independent of reflective of its creator, but in the use and application of the technology we will experience its true function and utility.

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## WHAT TO EXPECT IN THIS BOOK

The authors of the chapters in this book are most certainly early adopters/adaptors, skeptics, cheerleaders, and pedagogical innovators. But above all, they are scientists and understand that “not all that shines is gold.” As social scientists, they are also acutely aware of the impact, both positive and negative, that technology has had on the field of education. This book attempts to provide you with some advanced knowledge as to the costs and benefits of instructional technology so that you can select which ones you want to explore. To that end, the book has been divided into three sections.

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## PART 1 - HOW TECHNOLOGY HAS RESHAPED HUMAN COGNITION

In this section, the authors explore not only how technology has had an impact on teaching practice, but how it has a direct impact on the ways in which we perceive, remember, and learn. These writers shed light on some of the most compelling questions of how the human mind interacts with the machines we have built. These topics include:

- Adjusting our methods and approaches to account for the cognitive habits and skills developed in the minds of digital natives, individuals who have grown up with computer and communication technology.
- An exploration of the possibility that our technologies may be too helpful and thus inhibiting the development of effective problem-solving skills.
- The prevalence of distractions competing for our students’ attention and solution to help them focus.
- The increasing concern regarding how students can access vast repositories of information, but may be challenged by the ability to process this information on a deeper level.
- How technology, designed specifically to attract our attention, may have both a positive and negative impact on students’ ability to focus.

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## PART 2 - EDUCATION TECHNOLOGIES THAT INSTRUCTORS USE TO TEACH STUDENTS

In this section, we explore a variety of specific technologies and their implementation in the classroom. These essays focus on the critical evaluation of their effectiveness and efficacy in teaching and learning. These technologies include:

- Engaging students in blended and online courses.
- Exploring group-work within a blended learning environment.
- Incorporating asynchronous online discussions in blended and online courses.
- The use of Learning Management Systems
- Engaging students in asynchronous online courses.
- The use of Open Educational Resources to increase access to a wide range of material and to increase motivation.
- Designing inclusive environments for students with disabilities.
- Digital tools that allow students to interact with materials and with each other.
- Mobile Devices.
- Electronic textbooks, eBooks, and Digital Study Aids.
- The development of academic skills and digital literacy among student athletes.
- Applying concepts of developmental psychology in a virtual parenting environment.
- Using animation software to engage students in course material.
- Using technology to teach CBT and mindfulness concepts to children.
- Teaching students about technology, distraction, and learning.
- An exploration of how technology can be used to for service learning projects.
- How technology can be used to enhance specific writing skills, such as APA formatting.

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## PART 3 - HOW SOCIAL MEDIA IS USED TO ENGAGE STUDENTS IN LEARNING

Social Media is ubiquitous. As with many forms of technology and communication, many teachers are eager to explore how this engaging environment can be used in the classroom. Our students have clearly indicated how captivating these technologies can be, particularly when they are using them non-productively in our classrooms! Clearly, they could be powerful instructional tools if examined in the following ways:

- Using phone apps to increase student engagement.
- Effective blogging practices.
- Integrating Twitter into the Introduction to Psychology curriculum.
- PechaKucha in the classroom.

This collection of work reflects an amazing variety of viewpoints. Ultimately the process of incorporating or adapting to technology in your own classroom is an individual one. Hopefully, the information in this book will help you avoid the same mistakes made by early adopters and to go into the process understanding the risks and benefits. For us clinicians, this book serves as a form of “Informed Consent.” Use it well.

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## A SUMMARY AND SOME BASIC ADVICE

For over 20 years, this author has been using advanced communication and computer technology in the classroom (not just chalk and markers!). Early adoption and experimentation with technology in the classroom, online teaching and learning, and the exploration of such innovations as digital textbooks and 1:1 device programs have punctuated my entire career. Through this experience, I offer a few tidbits of basic advice (feel free to write these out on your whiteboard!):

1. Investigate the pedagogical utility of technology thoroughly.
2. If possible, pilot the technology, or at least embed the technology in “low-stakes” activities.
3. If you select a technology for your students to use, be prepared to have a deep understanding of WHY you are using that technology in class.
4. You should be very “savvy” with the technology yourself. Despite the best intentions of student service supports, the teacher is the primary “technical support” contact.
5. Be patient with others who are not as savvy as you are. Someone has likely been patient with you.
6. Be ready to have the technology fail. I mean this in two ways. First, the technology itself may fail to work as it is supposed to. I believe Murphy would have had a law for this. Second, the pedagogical intent of the technology may fail. We need to be ready to learn, right along with our students.
7. Maintain a healthy sense of humor. As with many things, the stress of change and innovation can often hamper the very creative problem-solving skills needed to contend with it. Having fun with these technologies and being able to play on our all-to-human struggles with something that may seem easy can go a long way in managing change.

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# HOW TECHNOLOGY HAS RESHAPED HUMAN COGNITION

# TEACHING 21<sup>ST</sup> CENTURY BRAINS: ACTIVATING WORKING MEMORY IN THE ONLINE WORLD

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## INTRODUCTION

With advancing technology, it is becoming increasingly important to identify the types of digital media and teaching techniques that best facilitate learning. This chapter explains the concept of working memory (WM), associates WM with the frontal-most regions of the brain, and suggests teaching techniques that are likely to stimulate WM processing. The chapter concludes with recommendations to guide further research of media-based teaching techniques and their impact on learning.

Intentional learning requires intact executive functioning. This involves self-regulation of emotions and behavior through skillful task-switching and control of physical impulses, as well as the ability to monitor and update information in WM (Hofmann, Schmeichel, & Baddeley, 2012). All conscious thought involves WM, and therefore it is crucial to new learning. A strong, positive correlation exists between WM capability and scores on tests of higher-level cognition, such as reading comprehension, reasoning, and standardized achievement, among others (as outlined by Lusk, Evans, Jeffrey, Palmer, Wikstrom, & Doolittle, 2009; St Clair-Thompson & Gathercole, 2006).

Although some questions about memory functioning are not fully answered, many learning phenomena are accounted for by WM theory (Baddeley, 2012), which has developed across half a century. In 1968, Atkinson and Shiffrin introduced the idea that WM consists of a combination of storage and control processes. Baddeley and Hitch (1974) examined the storage capacity limitations of WM, or the idea that there is a limit to the amount of information that can be considered at any given time; they also coined the term “central executive” to describe the control processes that allow for higher-level cognition. Later, Baddeley (2000) explained that the central executive allocates attention for the full range of routine monitoring to novel information processing. In the updated theory, an “episodic buffer” was added, which accounts for the integration of verbal and acoustic material with visual information and allows for new thought formation through joining long-term memories with current sensory experiences (Baddeley, 2000).

The frontal lobe of the brain orchestrates “working-with-memory” on explicit, goal-directed tasks (Moscovitch, 1994). In Moscovitch’s model, brain regions are associated with specific learning and memory functions. The job of the frontal lobe is to control attention and command strategic processing. The foremost part of the frontal lobe is referred to as the prefrontal cortex, or the association frontal cortex, because it is extensively interconnected with other regions of the brain. Neuroanatomically prepared to guide human behavior, the prefrontal region plays a critical role in modulating inputs from posterior and lower brain tissues, which store long-term memories and contribute emotional value to memories, respectively (Stuss & Benson, 1986).

In a review of the literature concerning the neurological bases of WM, Funahashi (2017) confirmed that the prefrontal cortex in primates and humans not only maintains information but also directs information manipulation. For learning to occur, new information needs to be encoded and later remembered. Frontal lobe dysfunction causes poor organization during encoding and decreased search and monitoring during retrieval (Moscovitch, 1992). Encoding processes often depend upon structures within the inferior, prefrontal areas whereas information retrieval is typically processed in the dorsolateral and anterior prefrontal regions (Wagner, 1999). Specifically, the dorsolateral prefrontal cortex (DLPFC) is flexibly responsive during goal-driven learning tasks (Dubin, Maia, & Peterson, 2010). Lesion studies affirm the role of the DLPFC in WM tasks requiring the manipulation of spatial and/or verbal information (Barbey, Koenigs, & Grafman, 2013).

To encourage WM processing (and thus, by extension, use of the prefrontal cortices), five general teaching tactics will be reviewed. Special attention will be given to how technology contributes to, or detracts from, the learning process.

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## TECHNIQUES FOR ENLISTING WORKING MEMORY IN SUPPORT OF LEARNING

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### 1. AVOID MEMORY OVERLOAD

Fast-paced lessons and covering too broad a scope of information can adversely influence learning, particularly for students with lower WM capabilities. Lusk et al. (2009) compared how well undergraduate participants with high versus low WM capacity learned from a multimedia tutorial that was either nonsegmented or segmented (with segmented meaning that the 11-min video was divided into 14 narrated segments of 45-60 s each). Higher WM scores led to superior learning in the nonsegmented condition, but those with lower WM scores were able to understand the video content as well as higher WM students when they viewed the segmented tutorial (Lusk et al., 2009). In summary, the pacing became manageable for students with lower WM capacity when the video was broken into manageable pieces.

Naïve learners are susceptible to WM overload. Sometimes presenting less information produces more learning, especially with young learners or students diagnosed with learning disorders (Littlefield & Klein, 2005; Littlefield, Klein, & Coates, 2012). When tangential information or too much information is offered during learning, more attention needs to be allocated to decide which information is relevant. This overloads WM. An online measure called the Association Memory Test (Klein, Littlefield, & Cross, in press) can be used to compare a simple learning condition to a more detailed learning condition. During the simple learning condition, symbols are shown one at a time while the word that goes with each one is heard. The detailed learning condition simulates what a teacher might say to help a student learn by adding sentences that meaningfully associate each symbol with its paired word. The simple learning condition typically results in better retention than when the sentences are also provided (Klein et al., in press). Precise recall of the symbol-word pairs seems to be enhanced by keeping initial learning uncomplicated.

St. Clair-Thompson and Gathercole (2006) recommend structuring lessons and activities to limit the amount of information to be processed and allowing the use of external memory aids. A common technique used to reduce cognitive load in new learners is being able to study worked examples, as opposed to solving the problems themselves (Paas, Renkl, & Sweller, 2003). Paas and colleagues make the essential point that learner expertise and instructional techniques interact, meaning that those who are more familiar with the foundational information in an area of study will have capacity available to process more difficult material. This concept may be particularly

important for digitally-based assignments. For example, when completing online assignments, information provided by hyperlinks can overwhelm a beginner. Providing a list of allowable websites can minimize this problem.

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## 2. ENCOURAGE STUDENTS TO TAKE HANDWRITTEN NOTES

Taking lecture notes places high demands on the central executive component of WM, as it requires comprehension, selection of information, and logical organization of current auditory inputs, while simultaneously writing what was presented previously (Piolat, Olive, & Kellogg, 2005). Some research has provided evidence that handwritten note taking can facilitate learning, whereas typing notes on a computer or tablet appears to be associated with poorer learning outcomes. Sophomore students taking Principles of Economics at West Point were randomly placed in conditions of technology-free classrooms versus technology-enabled classrooms (Carter, Greenberg, & Walker, 2017). Average final exam scores of those in technology-free classrooms was 18 percent of a standard deviation higher than the exam scores of students who typed their notes. Mueller and Oppenheimer's (2014) study utilized 15-minute TED talks. After a 30-minute delay period that included distractor tasks, they discovered that while there was no difference in ability to respond to factual questions, handwritten note takers were much better at responding to conceptual questions. Qualitatively, Mueller and Oppenheimer (2014) found that students who typed their notes were more inclined to transcribe the talks whereas students who wrote out their notes tended to organize the information from the TED talks. Their interpretation was that typing notes carries a tendency toward shallower processing. Piolat et al. (2005) concurred that transcribing notes is less effortful than extracting ideas for notetaking. Because notetaking is cognitively demanding, learners with lower WM capacities may meet with less notetaking success. It is worth highlighting that findings from these notetaking studies were not attributable to multitasking, although a related line of work discovered that shifting between note taking and online tasks unrelated to the lecture not only leads to lower test scores for the multitasker, but also for peers who can see the screen of the multitasker (Sana, Weston, & Cepeda, 2013).

One may wonder if certain handwritten notetaking methods are better than others. A simple distinction can be made between traditional, linear techniques (like recording ideas using bullet points) and non-linear methods (such as concept maps and diagramming that graphically organize content). Comparing knowledge of video clip content between adult learners who had experience with non-linear notetaking techniques and those who did not, non-linear methods resulted in 20% higher comprehension upon later testing (Makany, Kemp, & Dror, 2009). Refer to Makany et al. (2009) for additional details about non-linear notetaking techniques, which appear to help the learner organize content conceptually.

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## 3. ORGANIZE CONTENT DURING THE LEARNING PROCESS

Information to-be-remembered is better recalled when it is processed for meaning and organized during the learning process. For instance, organization of lists during encoding leads to better learning outcomes (Bellezza, Cheesman, & Reddy, 1977; Dick & Engle, 1984). Dick and Engle (1984) tested 2<sup>nd</sup> graders on 20-item lists of pictures and found that students demonstrated superior retention when they were directed to organize the pictures based on how they were related to one another. Thinking of the purpose of the items pictured or their personal experience with the items was not as fruitful.

Otten, Henson, and Rugg (2001) presented one word at a time on a screen and asked participants to make dichotomous decisions about the words under two different conditions: whether or not the first and last letters of the displayed word were properly alphabetically ordered (nonsemantic processing); or whether the word displayed represented something that was living or nonliving (semantic processing). Recognition accuracy was significantly

higher for words that were processed semantically (Otten et al., 2001). This shows that even during a task when participants did not know that they would be asked to recall the words, recollection was improved by meaningfully processing them. This deep processing effect was documented in 1975 when Craik and Tulving determined that the qualitative nature of judgments made about words influences their later recognition. Anderson and Reder (1979) further asserted that increased elaboration leads to superior learning outcomes. They described this as a “breadth of processing” effect (p. 385), where higher quantity of semantic elaboration is more important than the quality of those elaborations. In other words, Anderson and Reder argued that the ability to recall information later predominantly relies on the extent of information processed.

Descriptions, summarization, review, and evaluation can be valuable reflective learning tools because they increase semantic elaboration. Reflection can be useful at any phase of learning (Pedaste et al., 2015). Journaling, with or without guiding questions, is a widespread method for provoking reflection. Prompts for reflection can be delivered face-to-face or online. A study of 9<sup>th</sup> graders provides an online example. Students completed an inquiry-based science project via an online learning environment (Mäeots, Siiman, Kori, & Pedaste, 2016). Students who reflected at a higher level throughout the project were also more successful in producing concrete learning outcomes. Another example of semantic elaboration is adding teacher annotations to e-books. College students taking a computer networking course were randomly assigned to paper textbook and electronic textbook groups, and were subsequently assessed on their learning (Dennis, Abaci, Morrone, Plaskoff, & McNamara, 2016). The e-book group was exposed to annotations from the course instructor, some of which elaborated upon the book content. Dennis et al. (2016) found that groups performed equally well on a multiple-choice quiz, but that the e-book group outperformed the paper textbook group on their responses to an open-ended, applied question.

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#### 4. TEACH STUDENTS HOW TO SEARCH THE INTERNET

Many university students and adults use the Internet as their primary resource when seeking information (Griffiths & Brophy, 2005; Helsper & Enyon, 2010). Due to the perpetual accessibility of information, people are prone to gathering information quickly without taking the time needed to critically evaluate it. Different strategies for reading and knowledge gathering may be exercised when searching the Internet than when utilizing printed sources. Liu (2005) recorded self-report data from 100 adults aged 30 to 45 in order to characterize their perceptions of how their reading behavior had changed over the past decade, presumably as a result of having more Internet access. At least 75% of Liu’s (2005) sample endorsed increases in non-linear reading (i.e., skipping around, such as through following hyperlinks), more scanning resulting in cursory reading, and greater selectivity in choosing what to read.

How have Internet reading behaviors altered the way people think about and retain information? Are people becoming more cognitively lazy without realizing it? In a study of university students who were divided into Internet and encyclopedia groups and allotted 40 minutes to search for the answers to 60 questions, the encyclopedia group was more accurate in recalling correct answers to questions (Dong & Potenza, 2015). Fisher, Goddu, and Keil (2015) found that actively searching the Internet gives people the “illusion of knowledge,” meaning that they have high confidence in the knowledge gained despite not fully understanding the content. This false sense of understanding could be partly attributable to WM capacity limitations. Relatedly, Internet use may lead to quick acceptance of ideas or solutions without serious consideration. When university students could view the analytical processing steps followed by another person within a social network, researchers found that students tended to copy the response, an effect they referred to as “unreflective copying bias” (Rahwan, Krasnoshtan, Shariff, & Bonnefon, 2014). Instead of adapting the logical reasoning method for answering subsequent items, students passively accepted someone else’s answers. Therefore, having solutions available led to poorer learning outcomes.

With the presence of irrelevant content, misleading information, and pre-packaged answers, learners need to become wise searchers and deep thinkers. Otherwise, they may be susceptible to unreflective copying bias and the illusion of knowledge. Adolescents, in particular, may not have the ability to assess the veracity of information accessed (Michaud & Bélanger, 2010). Internet navigation skills can be taught for locating solid, peer reviewed resources. Refer to Fornaciari and Loffredo Roca (1999) for a thorough review of the problems involved in Internet searches, as well as “solution steps” for finding relevant, academic resources. Leitch (2014) offered 51 exercises for evaluating authority. Some traditional college classroom exercises are shared, such as debate, but other suggestions require assessing websites and analyzing Wikipedia. For younger students, assignments requiring the search for multiple perspectives on one topic, as opposed to relying on one source, is a good start. When learners appreciate the need to evaluate ideas, they are better poised to make inferences about the reliability of sources.

Interestingly, performing skilled Internet searches causes frontal lobe activation, which is a sign that effortful thought is in progress. Studying people in their mid-50’s through mid-70’s during Internet searches, it was determined that older individuals with technology experience employ more brain regions while searching compared to those with less technology experience (Small, Moody, Siddarth, & Bookheimer, 2009). Incorporating a similar method of comparing older individuals who were new to technology to those who were experienced with it, Small and Vorgan (2008) found no differences in activation between groups while reading, but Internet-experienced participants evidenced increased left dorsolateral prefrontal cortical (DLPFC) activation while performing Google searches. After a week of daily Internet search practice, activation patterns became similar between the groups (Small & Vorgan, 2008). Perhaps the increased activation is due to the top-down nature of an effective search task. It is speculated that the low technology experience group learned how to perform a strategic search, rather than just read off of the screen. Successful Internet searches require executive decisions about where to click next and which key words to use.

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## 5. INSTRUCT STUDENTS TO RETRIEVE NEWLY-LEARNED INFORMATION

With abundant knowledge available 24/7 on the Internet, students rely on devices more and more to access information. Through a series of experiments, Sparrow, Liu, and Wegner (2011) discovered that people typically remember where information is stored but are less likely to retain the specific information. Recalling the source of knowledge (or where the answer can be found) may sometimes be perceived as more important than knowing the answer itself. On the other hand, being informed that the information will be unavailable later increases one’s chances of recalling it (Sparrow et al., 2011). It seems that unavailability increases the need for effortful processing. Effort expended during the encoding process allows a cue to be available for later retrieval.

Increased DLPFC activation occurs while participants retrieve information learned from an Internet search (Wang, Lu, Luo, Zhang, & Dong, 2017). In order to arrive at novel ideas and creative solutions, learners need to retrieve old knowledge and logically integrate it with new information. This integration is made possible through the episodic buffer of WM. According to Baddeley (2000), the episodic buffer is a temporary storage interface that pulls together information from various sources to make sense of, and to accumulate knowledge about, the surrounding world. Auditory-verbal and visual-spatial experiences are integrated with long-term memories, thereby updating one’s knowledge. In this way, the episodic buffer retrieves pertinent information from long-term memory, integrates it with newly perceived information, and then sends updated ideas back to long-term memory for later use.

Research has shown active retrieval solidifies long-term learning in classroom settings (Agarwal, Bain, & Chamberlain, 2012) and in laboratory settings (Karpicke, 2012; Karpicke & Roediger, 2010). Reading and then trying to retrieve what was just read produces better long-term recall than reading alone (Karpicke & Roediger, 2010). This

highlights the fact that, together, reading and retrieving are a powerful learning combination. Karpicke (2012) points out that students do not think that retrieval will be as valuable as other methods, but it consistently yields higher retention scores than other forms of learning. Interestingly, retrieval practice is effective when students produce the response or simply think about it (Smith, Roediger, & Karpicke, 2013).

Reconstructing knowledge appears to be a robust way to enable future recall, and some forms of technology facilitate retrieval practice. During classroom time, response systems can be used to intersperse review questions with lecture so that students can both practice retrieval and verify understanding. Meta-analysis reveals that classrooms which employ clicker response systems tend to have a small, but meaningful, learning advantage over their non-response system counterparts (Hunsu, Adesope, & Bayly, 2016). The bottom line is that less practice leads to lower mastery of content. Undergraduate marketing students were given the opportunity to review throughout the semester by accessing online quizzes to practice course concepts; students with the lowest number of review attempts performed the worst on the midterm and final examinations (Wellington, Hutchinson, & Faria, 2015). Traditional retrieval methods presented online, like flashcards and quizzes, reveal scores and reaction time data for students to compete with one another. Because these tasks are engaging and game-like, it is speculated that students may choose to review more.

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#### CONSIDERATIONS FOR FUTURE RESEARCH

How does technology impact human thought and brain structure? There are unanswered questions and mixed findings concerning how WM and technology interact. In order to evaluate conclusions made in the literature, three presumptions committed by past researchers are identified and described in this section.

One presumption is that younger people have a proclivity for multiple forms of media while older people have low technological competence. The characterization of Prensky's (2001) "digital native" has been referred to as a stereotypical overgeneralization because there are differences in technology use based upon country of origin, socioeconomic status, and educational background (Koutropoulos, 2011). Helsper and Enyon (2010) asserted that within any group of people, there will be a continuum of technology skills. Instead of dividing research groups by age, it is better to divide them by level of preference for, and amount of experience with, technology.

Another reason not to contrast older with younger participants is that comparing young brains to older ones is problematic given the possibility of pre-existing processing differences that may have nothing to do with technological exposure. Brain imaging reveals that, as adults age, linear decreases are seen in DLPFC activation during both encoding and retrieval tasks (Grady, Springer, Hongwanishkul, McIntosh, & Winocur, 2006). Younger adults and adolescents, on average, use DLPFC regions more than older adults when posed with new learning tasks. When feasible, cross-sequential designs are recommended to better characterize thinking and brain changes by following different aged cohorts over time.

A second presumption is that today's adolescent thinks in a markedly different way than yesterday's adolescent. Dramatic commentaries about deteriorating attention spans and poor executive functioning prevail, but controlled studies on today's adolescent are needed to understand the benefits and risks that technology brings. Adolescent and young adult learners prefer to task switch (Loh & Kanai, 2015; Rosen, Carrier & Cheever, 2013), but it is not known if yesterday's adolescents were prone to task-switching as well. Through surveying first-year university students, Thompson (2103) concluded that the relationships between technology and learning styles are not strong, but they are present. Frequent use of rapid communication tools and web resources is correlated with lower self-

reported productive learning habits, such as being able to resist distractions, reflecting when reading, and seeking conflicting views when studying a subject (Thompson, 2013). Loh and Kanai (2015) describe poorer executive control abilities of digital natives and speculate that the changes in thinking are probably associated with changes in brain structure. In reviewing the literature concerning the Internet and its impact on adolescent cognitive development, Mills (2016) concluded that there has simply not been enough empirically-based research to show a causal connection between high Internet use and changes in adolescent cognitive development.

It is fairly well-documented that the teen brain is capable of flexible reorganization and that frontal lobe development continues into the twenties (Giedd, 2012). As has always been true, any repetitive activity can strengthen pathways within the brain, and while the brain remains somewhat malleable throughout life, its peak changeability occurs prior to adulthood. Yet, most brain functioning studies examine university students or adults. If knowledge about the developing brain is sought, then more research needs to incorporate younger participants.

The third, and final, presumption is that brain imaging data collected during learning tasks is easily translated and understood. Modern neuroimaging technologies can provide a window into the structural correlates of brain functions, but the human brain is extremely intricate with many circuits working in parallel. Therefore, interpreting scans involves intelligent guesswork. One complexity is that experience results in differential activity levels. Those with experience at a particular task seem to develop honed, organized brain networks that are activated during task performance (Amoruso et al., 2016; Haier, Siegel, MacLachlan, Soderling, Lottenberg, & Buchsbaum, 1992), rather than the more diffuse activation seen in novices. Similarly, prefrontal activation is not always consistent with increased performance; novices may need to enlist prefrontal cortices more than experts due to the level of effort required. A brief description of how functional magnetic resonance imaging (fMRI) works provides additional insight into problems with interpretation. Analyzed from a subtraction method, fMRI signals during non-task trials are subtracted from those produced during the task of interest. Pictures of the brain during task performance are created in response to deoxygenated blood in a magnetic field. Logical suppositions are made about blood oxygen-level dependent (BOLD) changes, which are indirect measures of task performance (Chouinard, Boliek, & Cummine, 2016). According to Logothetis (2008), thinking that the BOLD response is solely caused by excitatory neuronal activity during task performance is a flawed assumption.

While functional imaging can be helpful in drawing inferences about structure-function correlates, other methods of discovery should be taken into account, such as observations, rating scales, and neuropsychological tests. Future research might incorporate scales of self-regulated learning, which can measure WM's central executive. One promising measure is the Self-Regulation of Learning Self-Report Scale that contains subscales for planning, self-monitoring, and reflection, to name a few (Toering, Elferink-Gemser, Jonker, van Heuvelen, & Visscher, 2012).

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## FINAL THOUGHTS

Controlled research is needed on the use of different media-based teaching techniques and how they engage students while benefitting learning. Regardless of teacher preferences, experience with technology, or age of the learner, certain techniques will induce learning: those that enlist effortful WM functioning. Due to the ongoing debate as to whether or not WM training is effective (Melby-Lervåg & Hulme, 2016; Morrison & Chein, 2011; Shipstead, Redick, & Engle, 2012), it is best to focus on teaching techniques that support a range of WM capabilities. Examples include teaching students to conduct wise Internet searches, incorporating presentation techniques that increase organization of content and decrease memory load, encouraging handwritten notes, and practicing active retrieval of newly-learned information.



Twenty-first century brains will slowly adapt to the technology-rich environment. Nonetheless, significant brain changes due to heavy exposure to media technology appear to be overstated. Choudhury and McKinney (2013) assert that the opposing views of “neuro-alarmism” and “neuro-enthusiasm” need to be tempered. Similarly, Sprenger (2010) advocated for a balance of traditional and technological tools that can appeal across student learning styles. We recommend adoption of the WM concept to facilitate the search for the most effective teaching techniques.

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# A “TROUBLESOME EFFORT”: FOCUSED ATTENTION AND DEEP PROCESSING IN THE DIGITAL AGE OF TEACHING AND LEARNING

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## INTRODUCTION

*“To most people nothing is more troublesome than the effort of thinking.”* (Bryce, 1901)

We live in an era in which we are relentlessly presented with triggers distracting us from tasks that require focused attention and deep processing of information. Teaching and learning are two such tasks. In truth, human kind has always lived in an era with distractors; today’s digital distractors are merely different in kind, frequency, and immediacy but not in effect. They present themselves in the form of auditory dings, pings, or rings, visuospatial cues, or tactile vibrations emitted from our cell phones, tablets, and laptops to tell us that something else is clawing for our attention at this particular moment. Usually this something else is seductive – so much less demanding of our mental effort, so much more affectively alluring, so much more time sensitive (or so we convince ourselves). We are conditioned through positive or negative reinforcement to allow our attention to drift to the digital triggers. This reinforced behavior quickly becomes a habit or worse, an addiction (Berridge & Kringelbach, 2015; Lin, Zhou, Du, Qin, Zhao, Xu, & Lei, 2012). Hardly anyone is immune: Whether we are digital natives or digital immigrants (Prensky, 2001), many of us find ourselves fighting the urge to check email and respond to texts throughout the course of the day. Ubiquitous distraction can then lead us down a slippery slope to multitasking. Multitasking has always been with us too, but has seemingly become much more pronounced in the digital age. What can we do to help our students (and ourselves) resist or prevent distractions, avoid the allure of multitasking, engage in more focused attention and deeper processes, and thus become better learners (and teachers) in the digital age?

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## THE DISTRACTION DILEMMA

Learning that happens in the classroom or during study – unlike classical or operant conditioning learning – requires cognitive effort to stay focused and process information deeply (Goleman, 2013; Rosen, 2013). This is a “troublesome effort” especially in the digital age for the many who are driven to digital distraction and compelled into doing double (or multiple) duty with their limited attentional resources.

Consider the following excerpt from *The Iliad*:

*As for now a black ship let us draw to the great salt sea  
And therein oarsmen let us advisedly gather and thereupon a hetacomb  
Let us set and upon the deck Chryseis of fair cheeks  
Let us embark. And one man as captain, a man of counsel, there must be.*

- Homer (quoted in Havelock, 1963, p. 81)

Reading this passage is laborious to most contemporary readers of English. Comprehending it requires allocation of substantial attentional, working memory, and language processing resources and takes a second (or even third) reading to interpret and fully appreciate the meaning of the words. If a text, Facebook, Twitter, Instagram, or email notification happened to beckon while reading this passage, how likely would one be to sneak a glance to see who or what sought attention? I can answer that as it happened even as I was typing the passage above: Very likely. Not only did my cell phone start vibrating with an incoming call, but so did the Fitbit I wear on my wrist. I could not help but glance at the phone, sitting on the table next to my laptop. I determined in that momentary glance that I would let the call go to voicemail so as to not break my train of thought. But the problem is that *it was already too late*. In the second or so that it took me to glance at the phone, read the caller's name, and make a decision not to answer, I had already broken focus and engaged in a conflicting, resource dependent task. I then had to devote cognitive resources in order to redirect my focus, regain my train of thought, and pick up writing where I left off. This type of resource-intensive activity inevitably detracts from learning or whatever cognitive task we are engaged in at the time, such as writing in my own case. The obvious solution? Turn the cell phone ringer off, leave the phone in another room, and/or remove the Fitbit while trying to engage in an attention- and process-intensive task.

Sometimes the distractions come from beyond our own sphere of control, however. In the classroom, the research quite clearly shows that performance suffers for students who are subjected to their classmates' Internet surfing during class (as do the surfers' grades themselves) (Fried, 2008). Anecdotally, we all know that our performance as teachers suffers when we are distracted by students' non-instructional laptop or cell phone use in the classroom. The objective and subjective evidence completely validates and justifies instructors' requests to refrain from behaviors that are distracting to instructor and students alike.

Technology can certainly take away cognitive resources and negatively detract from both teaching and learning. But technology is not all bad. Indeed, at the same time that the possibility exists that some form of technological trigger could detract from comprehending, say, a passage from the *Iliad*, this same technology offers a tremendously advantageous learning and teaching tool in other ways. For instance, in the passage from *The Iliad*, did you hesitate at the word *hetacomb*? If so, did you then actually look up the word? Today's readers are fortunate because technology makes the process of look-up and access so much more facile, efficient, and immediate than was previously possible. Earlier readers would have had to take a relatively pregnant pause in whatever they were doing to perform a look-up in an actual physical dictionary. Thus, the very same technology that diminishes through distraction also adds value through real time, immediate access to information. Other benefits of technology in instruction are manifold. We can illustrate and communicate concepts and ideas through multimedia presentation (e.g., YouTube videos, Webinars), develop creative, dynamic PowerPoint presentations instead of static overhead transparencies, provide computerized experimental simulations, and ask our students to create Wikis, ePortfolios, or Facebook pages to convey their learning (Gagnon, 2014).

These are all good uses of technology. But during real-time learning, technology that distracts or divides attention is an overall negative. The benefit of technology – real time immediacy and the ability to create – also presents a cost – real time distraction. We need to learn when to use technology for our betterment and when to let it go. The question is not whether technology is good or bad but rather, when and how can it best be used to expand and enhance human capacities, not “amputate” them (Lin, 2009)?

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## MULTITASKING MAYHEM

Gestalt psychologists knew more than a century ago that we cannot really hold two thoughts – or configurations – in mind at the same time. The classic demonstration is the three-dimensional Necker Cube that can be perceived from different orientations. The claim was that you cannot hold two opposing views in mind simultaneously, that the nature of cognitive processing requires that you alternate – perhaps quickly, but still consecutively and not simultaneously – between perceptions. Familiarity and practice make it easier to flip back and forth, eventually creating the subjective impression of holding the two configurations in mind simultaneously.

Multitasking – trying to do two or more things at once – is akin to this subjective sense of holding two perceptions at once. Anecdotally, students report that they can efficiently multitask across digital modes and media via their cell phones, laptops, or tablets, and when they are studying. We can accept they believe this because we observe it with our own eyes in the classroom. We see students sneaking text messages under their desks or surreptitiously sharing Snapchat photos on their cell phones; we see their eyes dart across laptop screens or fingers fly across keyboards, in a way that makes us suspect that something other than the class discussion is the focus of their attention. Students also claim that they are perfectly capable of doing this without cost to their own learning, but in this the research suggests that they are sorely deluded.

What the research shows is that multitasking is a misnomer. Rather than performing two tasks simultaneously, we are really toggling quickly from one task to another (Bowman, Levine, Waite, & Gendron, 2010). With practice, of the type that digital natives have acquired through a lifetime of using digital devices, the oscillation between digital sources can happen very quickly, but the tasks are still being processed sequentially, not simultaneously. We do see that multitasking can be improved through training and changes are observed at the neural level as well: the speed of prefrontal cortical processing increases with practice in multitasking (Small, Moody, Siddarth, & Bookheimer, 2009). But the sense of task efficiency is illusory. Studies show that self-described high multitaskers are actually worse than self-described low multitaskers at task switching (Ophir, Nass, & Wagner, 2009). The same study showed that high multitaskers were worse in terms of memory and focused attention as well. In another study, Foerde, Knowlton, and Poldrack (2006) showed that digital multitasking makes learning less efficient and the knowledge gained less useful later on. The lesson is clear: Those who swim in multiple digital weeds do so at their peril - they have shorter attention spans, are worse at shifting attention (slower and lose more information), have poorer memories, and have less generalized learning. Overall cognitive function – and learning – is better off in a one-at-a-time mode. As Rosen puts it:

For the younger generation of multitaskers, the great electronic din is an expected part of everyday life. And given what neuroscience and anecdotal evidence have shown us, this state of constant intentional self-distraction could well be of profound detriment to individual and cultural well-being. When people do their work only in the “interstices of their mind-wandering”, with crumbs of attention rationed out among many competing tasks, their culture may gain in information, but it will surely weaken in wisdom. (2008, p. 110)



The lesson for teachers and learners is that focused attention is necessary for learning. Doing less (one thing at a time instead of several at once) truly is more. And to ensure that, mechanisms to diminish distraction and deter multitasking need to be enacted in the classroom and at study. The empirical results simply do not support students' claims that they can do it all without cost; they measurably lose out in learning, experiences, and ultimately, wisdom.

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## DEEP PROCESSING

Another downside to the ease of access that technology delivers is that this very ease may result in shallower processing of information. In the pre-digital era, we might scribble down an unfamiliar word – *hetacomb* – on a piece of paper, save it until finally reaching a dictionary, and look it up at some future time. Was all of this perhaps enough active processing to burnish it more firmly into memory than a more immediate Google search does today? The research suggests that we are, in fact, losing our ability to retain information - offloading it - even as we are gaining skill at accessing it, a phenomenon known as the Google effect (Sparrow, Liu, & Wegner, 2011).

There is also empirical evidence that students learn better when notes are taken in longhand versus on a laptop (Mueller & Oppenheimer, 2014). The slower, intentional process of handwriting that cannot keep up with spoken speech leads listeners to have to think more deeply about what they are hearing and make decisions about what to capture in their notes. With a laptop, listeners can better keep up with speakers and tend to type verbatim what they hear, without deeply processing to determine what it is that is important to capture. Thus, laptop note taking turns into a shallow shadowing task. As teachers and learners, we need to be mindful and intentional of when and where technology is used both in the classroom and in study in order to encourage deep processing of information which in turn leads to better learning.

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## FOCUSED (NARROW) ATTENTION

Lin (2009) suggests the useful idea of *attentional breadth* and a distinction between *breadth-biased* (akin to wide bandwidth) and *focused* (akin to narrow bandwidth) cognitive control. I will simply refer to these as broad and narrow attentional focus, respectively. Narrow focus tasks are effortful and deplete limited capacity resources, such as working memory. Our prehistoric ancestors engaged narrow attentional focus to, for example, hunt, track, and gather, just as we engage them today to read, study, learn, and teach (and to hunt, track, and gather still). The alternative type of task engages broad focus and is the sort necessary to carry out a vigilance task. This is non-specific allocation of resources, of the type needed for scanning the environment. It is relatively non-effortful, not resource dependent, and not depletable in the same way that narrow focus tasks are. Broad attentional focus is not focused *a priori*, but is captured by salient stimuli. The Internet (or any medium) can call on either form, depending on the task. Surfing the net may call on broad focus, while writing emails may call on narrow. Watching videos or skimming Wikis and blogs may require either. For a non-digital example, imagine being in the library stacks looking for a particular book, call number in hand. This task requires a narrow focus of attention. Conversely, trolling the stacks – i.e., broadly browsing them – can result in joyfully leaving the library with many more books than we had initially come for because of all the “gems” we serendipitously found in our search. The two types of attentional breadth have always been in play; they are not unique to digital media.

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## ANTIDOTES TO DISTRACTION, MULTITASKING, AND SHALLOW PROCESSING

What can we do to help our students (and ourselves) overcome the distractions and lures toward multitasking and shallow processing that digital media seems to bring with it? Following are some general antidotes to the phenomena described above that can get in the way of learning.

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### DISCIPLINE

Students (and teachers) need to be disciplined and moderators of their own attentional assets. Knowing when and where to engage in broad versus narrow focus tasks is key. Compulsively checking text messages or Facebook during class, studying, or reading (*The Iliad* or otherwise) are not the right times. Instructors can prohibit or limit cell phone and laptop use in class. Students cannot allow broad digital tasks to crowd out and replace narrow focus tasks at study either, but will have to institute discipline of their own volition. Sharing the research findings described above with them may entice at least some to keep the digital media at bay when they study.

Instructors can encourage narrow focus in the classroom through activities that require deep processing: posing thoughtful questions for class discussion and debate, challenging group work that requires problem solving or innovation, providing time for in-class writing assignments, and posing problems to be solved independently. They can *discourage* narrow focus through straight lecturing. While lecturing was *de rigueur* in the pre-digital era, it is ineffective in an era where students have simply not had the amount of experience with focused attention that digital immigrants might have had in their own educational experience. Focus will flag quickly and students will succumb to digital lures. Instructors can encourage focused attention and deep processing during study time as well by assigning meaningful and appropriately challenging assignments and readings. But ultimately, students will have to learn to be protectors of their own attentional resources. They will have to learn digital discipline.

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### RESPIRE

One could argue that our current educational system privileges the narrow, focused form of attention to the detriment of processes that require breadth-biased cognitive focus. In doing so, do we chronically deplete our students' narrow focus resources? As I typed these thoughts, the familiar quote about the "forest for the trees" came to mind. I happen to have a copy of Bartlett's *Familiar Quotations* in my library so I decided I would take a break, wander to my bookcase in another room, and look it up "old style." As I walked across the house to get to the shelves, it occurred to me that not only did the process of engaging with a physical artifact result in a deeper processing of information for me, but it also offered me a noticeable respite from the narrow focus that I had been employing the entire morning. Respite is something we ought to be doing in the classroom and encouraging our students to adapt during study as well.

Lin's view supports this. Lin (2009) asserted that moving into a broad mode of attention may allow restoration of the narrow mode and may, in fact, be essential to it. Eco-psychologists likewise promote taking walks in nature – a broad focus activity – as a way of regenerating our ability to engage in narrow focused activities (Greenway, 1995). The resulting suggestion for encouraging focused attention and deep processing may seem quite counterintuitive, but productive nonetheless: *Encourage breadth-biased cognitive activities*. In class, we can do this through hands-on activities, computerized experimental simulations, self-reflection/journaling, and multimedia presentations. Students should be encouraged to take breaks from focused studying. Study break activities that promote broad focus include dining, chatting with friends, walking outside or running, and yes, even Internet surfing.

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## BALANCE

If discipline is key for knowing when to engage in a particular type of focus – broad versus narrow – balance is key for knowing how much of each to engage in. Perhaps the best way to help our students understand this is to be well balanced ourselves. Live lives as scholars and teachers, but also reveal our non-scholarly interests and lives as family members and athletes, musicians, activists, artists, or whatever our other interests may be. Demonstrate that one can engage in activities that call on broad focus (e.g., taking hikes in the woods or strolling through a city park) in a way that does not overwhelm our narrow focus occupations. In other words, be a role model of moderation and balance. Applying Lin’s narrow versus broad attention to the classroom, it might behoove instructors to offer the opportunity to engage in both, especially for longer class meeting periods. This can be achieved by interweaving narrow focus (e.g., lecture) and broad focus (e.g., hands-on) activities in class.

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## MINDFULNESS

Instructors must also recognize that individual differences in experience will play a role in students’ ability to focus narrowly versus broadly. A significant individual difference in today’s student population is relative exposure and use of technology, which typically correlates with generation and age (Kaiser Family Foundation, 2006). Digital natives are more practiced at digital multitasking (broad attentional allocation) than digital immigrants, who are more one-at-a-time thinkers (narrow attentional allocation). If digital natives lack sufficient experience with narrow attentional focus and are enticed into a life of distraction and multitasking, then one antidote is to teach contemplative practices. There are many contemplative traditions, but the one that is currently in vogue is *mindfulness* (Kabat-Zinn, 2012). Mindfulness is the very art of paying attention with intention. It focuses the mind, i.e., narrows attentional focus. (See Iwamoto & Hargis’ chapter for a discussion of mindfulness.)

Teaching focusing skills may not only help digital natives with learning but also with anxiety, which seems to have become epidemic in the digital age (Rosen, 2013). It is not surprising that an era of constant stimulation, information overload, and a surfeit of distractions should be accompanied by an increase of anxiety. The changes in our society now come so quickly and the demands to adapt so constant that it is no wonder everyone is on edge. Many individuals suffering from anxiety have gained great respite from practicing mindfulness (Goldin & Gross, 2014). Mindfulness may well be an antidote to distraction, multitasking, shallow processing, *and* anxiety.

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## ATTENTION HYGIENE: BEST PRACTICES FOR TEACHING AND LEARNING IN THE DIGITAL AGE

In summary, here is a list of “best practices” for encouraging focused (narrow) attention and deep processing, two elements that are necessary for student learning in any era. These practices amount to what might be termed *attention hygiene*, practices that allow teachers and students alike to decrease distraction, discourage multitasking, encourage deep processing, and balance broad and narrow attentional focus which should lead to more effective teaching and learning. They aim to make a “troublesome effort” less troublesome.

1. Discipline and Choice: Distraction is a choice that can be decided against. Encourage students to study and work in distraction free locations. Prohibit non-instructional forms of technology (cell phone, Internet surfing, social media, etc.) use in the classroom and encourage students to adopt this policy for out-of-class time that requires their focused attention/deep processing. Keep distractive technology out of reach, sight, or earshot at such times.

2. Reward: Think of broad focus activities as reward for engaging in narrow-based activities. Intentionally schedule broad focus time for interacting with technology. Check email (social media, etc.) at prescribed times of the day and only then. Think of it as “reward.”
3. Habit: Good attentional hygiene is a choice that becomes habitual with practice. Just as multitasking and digital distractions can become addictive through repetition, so too can healthy habits. Choreographer and dancer Twyla Tharp has a wonderful book on the development of habit that is a recommended read for anyone wanting to develop more discipline and healthy habit in their life (Tharp, 2006).
4. Mindfulness/Contemplative Practice: Encourage students to learn mindfulness or another contemplative technique that encourages one-thing-at-a-time thinking.
5. Modeling: Demonstrate healthy habits through role modeling. When meeting with students, turn your own cell phone off and provide an example of the lost art of *undivided* attention. If your desk phone rings while you are meeting with them, let it go to voicemail. Turn your computer screen off or close your laptop so you will not be distracted by whatever may pop up on it.
6. Deep Processing: Suggest that students take notes in longhand and that they employ non-digital sources of information. Taking notes in longhand makes for better learning and memory (Mueller & Oppenheimer, 2014; Piolat, Olive, & Kellogg, 2005). Suggest or require that students access information beyond what is available online (Sparrow et al., 2011).
7. Balance and Respite: If your class meeting period allows, allocate time to both narrow focus/deep processing tasks and broad focus tasks. Strike a balance and also encourage students to do the same with their own study time. Encourage them to take respite from narrow focus/deep processing with broad focus activities.

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# WHEN MORE IS LESS: THE RISKS OF OVERSCAFFOLDING LEARNING

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No one ever said teaching would be easy. The reality is that teaching is hard work. Even when it is done well, it is an endeavor rife with frustrations, exasperations, and unmet goals. In today's educational environment, it may be even more so, as technology impacts the rate of change in the expectations, goals and techniques of educators. In the last two decades alone, we have gone from chalkboards to overhead projectors to PowerPoint presentations and now to Learning Management Systems (LMS's). Since most teachers want to do well by their students and provide an optimal learning environment that contributes to their students' successes, they have worked assiduously to keep up with these changes. Yet, as often is the case, haste may be precluding a careful consideration of the implications of some of these changes. In this short chapter, I will discuss the possibility that by using all this new technology at our disposal, we may be *over-scaffolding* learning for our students, and this may have some repercussions that warrant both discussion and research.

Lev Vygotsky (1952) used the term *scaffolding* to refer to one of the processes whereby an expert supports a novice's learning by providing enough information or structure for the novice to be successful. A contemporary of Piaget, Vygotsky believed that all learning is social and that experts should convey information to novices in specific ways. Scaffolding requires the assessment of what a novice can already do, what a novice can do with help, and then the development of supports so the novice can operate at a higher level, eventually without those supports or scaffolds. At the point where performance is consistently at the higher level, the earlier supports, or scaffolding can be removed or discontinued, and supports for moving onto a higher level can then be implemented. An example of this is early counting behavior. A child might know the order of numbers, but not be good at one-to-one correspondence. The expert (who already knows this skill) might help the novice point to each object while counting. Soon the youngster is counting away, without the need for someone else to point out each object. If the next skill to be learned is counting by "two's" the expert will devise another method to scaffold that learning, and so on. Eventually, learners should reach a level of understanding where scaffolds are self-constructed, or they actively seek advice of experts in constructing their own scaffolds rather than relying on aids for their learning that are constructed by others.

Thus, the mature learner outcomes, according to Vygotsky, would be an individual who understands and scaffolds his or her own learning with only appropriate reliance on others. This self-understanding is essential because Vygotsky assumes that the now-expert learner will be able to use scaffolding to help others who have not mastered relevant skills. It is based on Vygotsky's ideas that I have come to use the term *over-scaffolding* to describe a perilous practice in which educators do not adequately assess or understand what their students can do, or should be able to do without assistance before offering them help to master a task. A brief search of the educational and psychological literature found only one other use of this term, referring to teaching second language learners (Daniel, Martin-Beltrán, Madigan, & Silverman, 2016). Interestingly, in this study, the practice of over-scaffolding language learning with prompts rather than insisting on active practice was found to hinder the language acquisition of the participants.

As modern teachers, we often use our LMS's and other technologies to provide scaffolding for our students because we not only think it will be helpful for our students to have as much of our help and guidance as possible as they endeavor to learn the content we present, but also because it is so easy to do. Many teachers now provide their students practice quizzes, handouts, slides, flashcards, sample papers and study guides without ascertaining first if those scaffolds are actually necessary. In the days of needing to type out, copy and distribute by hand such information, teachers surely were more judicious in the use of these supports. But now, with technology, it is possible for instructors to provide all this scaffolding to students quickly and inexpensively.

I propose that providing more scaffolding than students require may not be serving the students' best interests. As scientists committed to relying on evidence-based methodologies, it behooves teachers of psychology to take a close look at the ways we are incorporating technology in our teaching. Unfortunately, this change has happened so quickly that research has not been able to keep up. There has been no comprehensive review about the efficacy of this enhanced amount of scaffolding our students are subjected to. Cranney (2013) presented a cogent discussion as to why this research is so difficult to complete including ethical limitations and the impact of inflexible curricula. While there remains a considerable lack of consensus on the impact of technology-based scaffolds on learners and the learning process, there are a couple of active dialogues occurring among educators related to this idea. There is a longstanding conversation about the impact of pre- and self-testing (see Brown, Roediger and McDaniel, 2013) with a consensus emerging that such supports can be helpful, and a sense that many of the struggles our students have seem to be based on the understanding that today's students simply do not read as much as their predecessors did, nor are many of them reading at a level that will enable them to master material college material (Hoeft, 2012).

In the absence of a solid research base, I would like to utilize some anecdotal information to inform my discussion: It does not appear that the rise in the availability of easy scaffolding has resulted in a subsequent rise in student achievement or sophistication of work. While this is my personal experience, and that of many of my colleagues, I believe that if, indeed, there had been such a spike in college performance related to increased scaffolding, there would have been significant headlines to that effect. I will also note that there have been few studies that report a sharp decline in college performance either. Thus, for the purpose of this discussion, I propose that we do not know what effect this increase in scaffolding has on college achievement. However, I believe that there may be some non-cognitive outcomes of teachers being too helpful that we should pay attention to.

Given this muddiness in the new research, I find myself considering the theoretical orientations and practical advice of some of the early thinkers in this field as I consider my own teaching choices. Since understanding learning has been foundational to psychology throughout its history, it is interesting to look back at what some of our pioneers believed about the process of teaching and learning. Psychologists have always attempted to improve lives, especially when it comes to the questions about what leads to good learning outcomes for the most people. I would like to compile some of their ideas in the service of making sense about what our reliance on technology could be doing to learning and learners.

Jan Piaget (1952) and the neo-Piagetians such as Robbie Case (Case, 1992) and Kurt Fisher (Fisher & Bidell, 1998) proposed that humans construct their understanding of the world by directly acting upon it and that knowledge is constructed in a stepwise, developmental process that proceeds from infancy to adulthood. Using this model, the job of the teacher is to present the student with appropriate materials, tools and experiences to create higher and higher levels of knowledge and more sophisticated concept formation. The end point of the process should be an adult learner who can manipulate abstract concepts, analyze information coherently and convey that information to others in meaningful ways.

Educators have long interpreted this theory as indicating that their job is to provide the correct environment for students to explore as they create knowledge, and thinking skills, for themselves (see Tomlinson-Keasey, 1978). As instructors, most of us are very careful to choose textbooks that provide our students with accurate and complete information and to create classrooms that allow the exploration of new material through discussions, group interactions and other activities. The Piagetian-style of education seems to be quite comfortable for many educators.

As discussed above, Vygotsky believed in the social basis of learning, to the extent that he declared that *all* learning is social (1952). He was more comfortable with the notion that it is acceptable to actively teach students rather than allow them to create their own understandings. He encouraged teachers to be very involved in both shaping and guiding the educational experience, but also maintained that such involvement needed to be based on an intimate understanding of both where the student was functioning presently, and what goal the student should be working to attain.

Albert Bandura (1977) is a proponent of the importance of *self-efficacy*—the belief in one’s own ability to master skills and perform tasks, and a large body of research exists that self-efficacy is a key to success in many endeavors. According to Bandura’s theory, the best ways to increase self-efficacy are providing experiences that support a student feeling capable of mastering whatever tasks are presented, and the necessary psychological strengths to tolerate failures without losing a realistic sense of their own competencies. It is important to note that self-efficacy is a concept that may or not be related to subject matter. A student may feel very confident in her ability to work math problems, but not to complete a group project or write a paper. Other students may approach their learning by feeling that they are capable of learning whatever they need to succeed.

Bandura’s concepts remain very current. For instance, recently, Charles Benight and his colleagues (Benight, Shoji & Delahanty, 2017) proposed the theory that one’s belief in the ability to handle challenges is a factor involved in whether PTSD symptoms develop following traumatic experiences. This research indicates that the relationship between trauma and PTSD is not linear, but that it is affected by a complex web of environmental and personal characteristics. In other words, a person seems to be able to handle traumatic events until and unless they feel the challenges are simply more than they can manage.

In a similar vein, Erikson (1950) felt that key psychosocial developments related to the learning environment included “Industry,” “Initiative, and “Autonomy.” Thus, to Erikson, a well-developed learner can function with an appropriate level of independence, is able to be a self-starter, and genuinely understands that he or she can contribute meaningfully to others, the environment, and society. The failure to develop these skills can result in an individual who is dependent on others, experiences shame and doubt and harbors feelings of inferiority. It would seem unlikely that this individual would be able to explore the environment, as Piaget encouraged, work comfortably with others, or develop a sense of self-efficacy, which, as Bandura’s work has demonstrated, is essential to becoming a competent learner.

And finally, we should remember Alfred Adler’s (1964) work. Adler was one of the early challengers to psychoanalysis’ reliance on psychosexual development. He described appropriate environments for children, and the appropriate roles of adults in children’s lives. He especially cautioned parents about pampering their children, as he believed those children did not grow up with the internal strengths to function well in adult roles. Dreikurs (Dreikurs & Stoltz, 1964) who continued Adler’s work after his untimely death, famously stated a belief that any time an adult did something for a child that the child can do himself, he has robbed that child of the opportunity to



develop self-esteem and feelings of self-competence. The similarity between Adler and Vygotsky on the importance of the environment, including the parents, teachers and peers on learning is striking.

In my oft-frustrated, wanting-to-do-better teacher persona, I try to rely on these theorists to inform many of the things I do in the classroom. Thus, I believe that the role of the teacher is to provide an appropriate learning environment with materials that can be explored and manipulated in the service of internalizing knowledge and building more sophisticated thinking skills. For a child, this might be blocks to count and rearrange to master math problems or construction paper, glue and toothpicks to explore bridge-building. For the older learner, it might include a well-stocked library of carefully chosen books and articles (or at least an excellent textbook). It might include high quality videos, access to scholarly research reports and presentations relevant to the material being mastered. In addition to these materials, it seems likely that an expert who can scaffold the student's learning is important. The expert can set the pace of the presentation of the material, check for comprehension, and provide necessary feedback to improve performance.

I often think that these theorists would shudder at some of the ways we are currently educating our students. They would look at our use of technology and have some serious questions to pose to us. Piaget might worry that rather than needing to explore the environment to construct their own knowledge, students are flooded with information from which they simply need to choose the data most interesting to them. This leads to skimming material and latching onto what is most attractive and easiest to digest. This is unlikely to lead to the in-depth reading and thinking that is essential to developing high-level analytical skills. Vygotsky would be concerned that the direct social interactions he believed were so important have been diverted into text-messages and whole class announcements. He might wonder if scaffolding is being carried out in a manner that fosters the optimal growth of independent learning skills or if students are becoming overly reliant on this scaffolding and not developing higher level self-organizational skills. Erikson might wonder how a child develops a sense of industry: young people today rarely have the opportunity to directly serve their families or communities. Rather than acting on their own and deciding what they want to do, they have either been kept busy with a wide variety of (adult organized) activities, or with multiple jobs, or allowed to entertain themselves with screens instead of interacting with others. Adler would fear that we are stunting our students by not allowing them to struggle, or deal with unpleasantness, boredom or even social rejection. I think these men would expect our students to be somewhat lazy and lacking in initiative, seekers of attention who are poor communicators, self-focused and unclear of their own skills and abilities to contribute to the learning environment. These theorists would be concerned that, at a deep level, because of the current learning environment, students do not feel competent to perform at the level being asked of them (even if they are) and that this lack of self-efficacy could hinder their educational attainment.

However, while channeling Piaget and Vygotsky, I try to keep in mind that I am not just teaching content, and I endeavor to pay attention to what a student is learning about learning, and about themselves, during the process of mastering the material I present. A growing body of literature is indicating that these non-content, or process factors play a particularly important role in student development. For instance, Dweck (2007) has explored the value of developing what she calls a growth mindset. Her research indicates that students who believe in their ability to learn and grow perform better academically than students who have a more fixed belief in what they can and cannot do. Duckworth (2016) has demonstrated that students who know they have the skills to persevere under less than optimal conditions have better learning outcomes than those who doubt their skills (even if there is no actual difference in skill level), and Zimmerman (2000) has found that students who demonstrate a sense of self efficacy and a willingness to actively engage in their own learning tend to be successful students. This growing pool of research seems to indicate that it is not just *what* is being taught, but also what the students are learning about themselves in the process that is important in student achievement.

I teach upper level courses at a large state research university. At the beginning of each semester I share with my students the bad news that I do not post lecture notes, PowerPoint slides, chapter outlines or study guides. I do not allow them to use their laptops, tablets or cell phones in class unless there is some compelling reason that they do so, and I require classroom attendance and participation. They are invariably chagrined, because this is a different learning environment than what they experienced throughout high school and even their early college years. A student will invariably ask why I will not do these things for them, and I simply answer that they do not need me to. As upper level college students, they should be able to read, take notes, make flashcards and set up their own study groups. I then ask them if they have heard of any research that indicates that, since it has been so easy for instructors to do these things via our LMS, college success has skyrocketed. They tend to look rather sheepish and admit that no, graduation rates and GPA's have not dramatically increased in the past few years. These students have been victims of overscaffolding. Their teachers have provided more information, support, guidance and mentoring than they need to be successful, and now they feel they need that scaffolding just to succeed. To the extent that technology makes this easy to do this, technology has contributed to this situation.

I am a pragmatic sort, and in the light of clear research to the contrary, I could accept all this technological intervention as a neutral factor in my students' educational journeys. However, I do not think the outcome is at all neutral. I believe we are creating a sense in our students that they need us to do these things for them. I know many students who will not even try to add a series of single-digit numbers without pulling out their calculators. I once had a student declare in class that he never would have made an "A" on his neuroscience exam if the instructor had not posted a study guide. My answer was, "How do you know?" It might have been easier and quicker for students to use instructor-generated materials, but since I dropped the extreme scaffolds in my classes, the grades have not declined at all, my classes still fill, I have not seen an increase in students dropping my classes, and many students have risen to the challenges presented to them. If they get an "A" in one of my classes, it is because they earned that grade. The "A" does not have an asterisk by it, indicating that it was received due to all the extra help provided by the teacher. (There is a similar situation in sports where records are posted with an asterisk, indicating that the record was set while the player was illegally using performance enhancing drugs.) Additionally, the number of e-mails I get from my students saying that they have appreciated that I pushed them out of their comfort zone and set the bar high in my classes has increased.

For instance, in one of my classes, I have students construct their own projects throughout the semester. I provide what I consider enough material, but they need to decide on the constructs they will measure and the interventions they will carry out. Just this semester, I had one student who returned to school after earning a Bachelor's degree in another area. She made it clear early on that she expected the course to be easy and that she should be able to sail through it – if only I was giving her enough guidance. After completing the first large assignment she posted the following: "I am happy that I chose this course even though I struggled some in the beginning. The challenge is what makes learning fun." I would like to think that she learned something important that was not related to the material covered in the unit. Another student in the same course stated, "I learned how important it was to plan carefully in advance. When I did that, the entire project went better." And from a student in another class, "While I didn't do as well as I would have liked, I learned how to study for tests, and am proud of myself for getting better later in the class." While I would like to think these students will also carry away the content we covered in class, I am certain that they will hang onto these non-content aspects of their learning processes.

So, what is a teacher to do? The answer lies in a clear process of discernment as the teacher establishes the parameters and expectations of the course. One way to do this would be to consider the level of the course and think about what a successful student would look like at the end of the course. Working backwards can clarify the appropriate level of scaffolding and minimize the tendency to over-scaffold. For instance, upper level college courses

should be considered one step before the work world or graduate school. Thus, I do not provide chapter outlines or study guides for that material because I cannot imagine a boss or graduate advisor providing such support, and I know clients do not show up with neat outlines of their lives so the clinician only must make brief comments on a form. Learning to read for meaning and importance, taking notes, preparing questions and understanding what is being asked are all very important skills for college graduates. These expectations can be laid out clearly in the syllabus and students can be put on notice that these are the course expectations. Similarly, I begin to build in the understanding that to be successful, a student must go beyond the basic requirements of a course. On the rubrics I provide, I always include a few “quality” points that are completely at my discretion. These have proven to be interesting – I am fairly stingy in awarding them, but I rarely have students complain or question these scores. I infer that most students know when they have not done an outstanding job, even if they have met the basic requirements. Learning how to go above and beyond, to impress a boss or graduate advisor, and to focus on creating high quality productions, are important skills to have, whatever the subject matter is.

Ideally an entire department would line up their scaffolding for their students. First year courses might include study guides, chapter outlines, sample tests, sample papers, a publisher-developed learning system, and a calendar that clearly lays out weekly expectations. These foundational courses might build in activities geared towards students exploring both their understanding of their own strengths and weaknesses and opportunities to explore a variety of learning situations such as small groups, online discussions, or self-study applications provided by the textbook publisher. Second year classes might expect the students to outline their own chapters and create their own flashcards and include assignments that begin to require a higher level of writing and more clarity of thought. Critical thinking could be introduced and scaffolded with appropriate rubrics and feedback. Helping students understand their own competencies and strengths, as well as what skills they should be working to develop would help these second-year students understand what experiences they should be seeking for themselves.

As students move through the program, the scaffolds at the early levels should be removed and replaced with scaffolding that the student creates for him or herself. Thus, junior level courses should have challenging textbooks with a great deal of material that needs to be understood, even if it cannot be “covered” in class lectures. Senior level courses should contain opportunities for self-directed work, high level analysis and integrative thought. Communication with their “expert” should be ongoing with the goal of developing personal and interpersonal skills that will translate to the next stage of their life or education.

A systematic reduction in the number of scaffolds students receive, and a reduction in the tendency of teachers to over-scaffold their students’ learning combined with opportunities for reflection and evaluation should result in students developing clearer understandings of their learning competencies. They will be less likely to see themselves as learners who need others to tell them what to do and what to learn. By not overscaffolding course material, students can learn what they are able to do and what they need to learn to do better. Hopefully through this process they will gain a sense of self-efficacy as learners. They can reap the rewards of doing things for themselves (initiative), move through life with a sense of self-direction (autonomy), know that they can help others, and contribute to the learning environment and accomplish real tasks (industry). By surviving struggles, or even failures, in a supportive environment they will not automatically feel inferior, or be afraid to take on new challenges.

I think the advice of Adler (1952) and Dreikurs (Dreikurs & Stoltz, 1964) is particularly salient – adults should not do for students what the students can do for themselves, for every time they do that, the student loses an opportunity to build self-esteem and experience self-efficacy. Just because over-scaffolding makes things “easier” for the students, it does not mean it is the right thing to do. And here I will throw in one last founding father of our science, Sigmund Freud (1901). Freud would remind us that our unconscious motivations, expectations and beliefs can be

very powerful. As teachers, we need to be very careful that we are not unconsciously giving our students messages that they cannot learn by themselves, that they are not competent enough to master college-level material and that they are dependent on their teachers' largesse to carry them through their college experience. If our students pick up these beliefs from us, consciously or unconsciously, we have done them a tremendous disservice.

To conclude, I would urge educators to think carefully about the unspoken messages they give their students through the expectations held for their behavior. Every time we over-scaffold for our students, we deprive them of an ability to explore what they are capable of and we give them an unspoken message that they need our help and are not capable of doing things for themselves. We would do well to remember that we are not only teaching content but we are helping our students develop their mindsets about learning, their feelings of self-efficacy as a learner, and their understanding of their own role in their personal learning process. And, it may very well be that those outcomes will be every bit as important as the subject matter we are conveying for their future success.

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# F-ATAL DISTRACTION: THE IMPACT OF IN-CLASS MEDIA MULTITASKING ON STUDENTS' CLASSROOM LEARNING

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## INTRODUCTION

Today's students are attempting to multitask more than any generation of the past 70 years (Carrier, Cheever, Rosen, Benitez, & Chang, 2009). This is problematic given that completing two cognitive tasks simultaneously is impossible—multitasking is a myth (Rosen, 2008). Although people may believe they are dividing their attention among multiple tasks, instead, at a cognitive level, they are rapidly shifting their attention between the tasks rather than completing them at the same time (Ward, 2010). Every time we switch from one task to another, we lose time, and the amount of time we lose increases with task complexity (Rubinstein, Meyer, & Evans, 2001). In addition to speed, accuracy suffers when we rapidly switch between tasks (Rogers & Monsell, 1995). In fact, according to Bailey and Konstan (2006), when a peripheral task interrupts the completion of primary tasks, people require up to 27% more time and make twice the number of errors on the primary tasks compared to when the peripheral task appears between them. Even those who frequently attempt to multitask are inefficient at doing so. People who report multitasking regularly are more distracted by irrelevant information in the environment, are less efficient at distinguishing relevant from irrelevant mental representations, and are less effective at fully switching to a new task without interference from the previous one than those who report multitasking less often (Ophir, Nass, & Wagner, 2009). Similarly, more frequent media multitasking is associated with poorer everyday executive functioning (i.e., self-monitoring, emotional control, planning, task monitoring, and attention), although the direction of influence in this correlational relationship is, as yet, unknown (Magen, 2017).

Although the loss of efficiency associated with task switching could certainly incur negative consequences for college students' academic success, another detrimental effect of multitasking on academic performance may emerge from the impact multitasking has on learning and memory. Multiple studies have demonstrated that multitasking results in weaker encoding of new information into long-term memory (Bailey & Konstan, 2006; Ophir et al., 2009). Because effective encoding of information is vital to remembering it later, it is not surprising that multitasking is also associated with impaired retrieval (Wickens & Hollands, 2000). Learning and memory are key components of performing well on academic assessments like quizzes and examinations. Thus, multitasking-induced cognitive difficulties have the potential to influence students' academic success negatively and substantially.

## PREVALENCE OF MULTITASKING IN THE CLASSROOM

Given the abundant evidence that “multitasking” is detrimental to cognitive efficiency and learning, ideally, students would refrain from media multitasking during class, but ample evidence indicates that they do not. Although they

may believe that they can multitask effectively, recent research suggests that today's students are no better at multitasking than members of previous generations (Carrier et al., 2009). Unfortunately, this does not deter most students from engaging in such behavior. In one survey-based study, 64.3% of students reported using laptops in at least one class period; those who used laptops used them during 48.7% of their classes, on average (Fried, 2008). Out of each 75-minute class period, students media multitasked an average of 17 minutes, or over 22% of the class time. These students reported that they checked email (81%), used instant messaging (IM: 68%), surfed the Internet (43%), played games (25%), and did "other" activities (35%). This is consistent with the results reported by McCoy (2016), who found that college students reported spending an average of 20.9% of their class time on digital devices for non-class purposes.

The high level of self-reported media multitasking in class may be, in reality, an underestimate of students' actual time spent off-task and on-media. Gathering student self-reports and simultaneously using spyware to observe students' classroom laptop behavior directly, Kraushaar and Novak (2010) found that the average student generates more than 65 new active windows per 75-minute lecture, with 62% of those windows being off-task or "distractive." What is more, students significantly underreport both their email and IM laptop use. Approximately 87% of the student sample reported using email during class, but the spyware indicated that 94% were on their email accounts. Furthermore, only 25% of students reported using IM during lecture, compared to the 61% who actually engaged in IM.

Although much of the research on students' media multitasking focuses on laptop use, mobile phones are also a significant source of distraction during class time. Junco (2012), for example, found that text messaging is a more common form of media multitasking in the classroom than using Facebook, accessing email, searching the Internet, or instant messaging. In fact, a majority of students (i.e., 69%) reported texting during class. Of course, students' use of these technologies is not mutually exclusive, and, in combination, they can significantly reduce students' ability to focus on learning during class time. Sovern (2013) classified 62% of students as "strongly distracted," which he defined as using laptops or cell phone for non-class purposes for at least half of the class period. Notably, these participants were upper-year law students who had much to gain from paying attention in class.

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## MULTITASKING AND CLASSROOM LEARNING

The prevalence of mobile phone and laptop use in college classrooms has inspired many investigations of the effects these technologies have on student learning. Willingham (2010) poses the thought-provoking, but as yet unanswered question: "Have technology and multitasking rewired how students learn?"

Although the impact of media multitasking on the internal process of classroom learning remains unknown, Lee, Lin and Robertson (2012) conducted an experimental study investigating how well students learn in the presence of (1) no media distractions, (2) a background media distraction that could be ignored, and (3) a background media distraction that required attention. They asked students to read and answer comprehension questions about a passage that they read under one of three conditions: in silence, with a video that would not be tested playing in the background, or with a video that would be tested playing in the background. They discovered that students effectively ignored the non-tested video, performing similarly to the group that read in silence on the reading comprehension test and remembering less content of the video than the group who paid attention to it. In contrast, the students who divided their attention between the passage and the video did not comprehend the reading as well as the other two groups.

This finding suggests that students can effectively ignore and learn in the presence of distractions, but typically mobile phones and laptops provide distractions that demand attention (similar to the attended-to video in the Lee et al. study). Therefore, these technologies have the potential to reduce the cognitive resources available for in-class learning. Additionally, other researchers have demonstrated that, even when performance on a cognitive task reaches the same level (like the similar reading comprehension scores of the students who read in silence and those who read while ignoring the distraction), different types of learning may underlie memory performance in single-task versus dual-task situations (Foerde, Knowlton, & Poldrack, 2006). They suggest that the declarative memories formed during focused attention afford learners more flexibility with applying the information to new contexts than the habit-based learning associated with divided attention.

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## MEDIA MULTITASKING ON MOBILE PHONES AND CLASSROOM LEARNING

The literature examining mobile phones in classroom settings is not extensive, but the studies that have focused on this issue have produced highly consistent results—mobile phones pose a significant distraction in the classroom and negatively affect students' ability to learn new material. Two studies to date have experimentally manipulated texting during an actual or mock lecture before quizzing participants over the lecture content (Ellis, Daniels, & Jauregui, 2010; Gingerich & Lineweaver, 2014). Ellis et al. (2010) randomly assigned 62 undergraduate business students either to a texting condition in which they generated three texts to their instructor during a lecture or to a non-texting condition in which they did not use their mobile phones during class. Students who texted scored significantly lower than those who did not on a post-lecture examination. Similarly, in two experiments, Gingerich and Lineweaver (2014) asked students to engage in a prescribed text conversation with another student in the room (text group) or to refrain from using their phones (no-text group) during a lecture. Not only did the no-text group significantly outperform the text group when answering content-focused questions on a subsequent quiz (79% vs. 60% in Experiment 1 and 83% vs. 73% in Experiment 2), but the no-text group also felt significantly more confident in their learning. Thus, students seemed to be aware that texting generally interfered with their learning. Interestingly, though, students in the no-text group were also much more accurate at predicting how well they would perform on the quiz. This suggests that multitasking during the lecture may have interfered with the metacognitive processes involved in the self-monitoring of learning for the students who divided their attention between the lecture and texting.

The magnitude of the interruption posed by texting during class appears to depend on several factors. Rosen, Lim, Carrier, & Cheever (2011) examined students across four different classrooms who received no text messages, four text messages or eight text messages from the researchers during a lecture. Students responded to these text messages, but they were also free to receive, respond to, or initiate other text messages with outsiders during the lecture. When examining students' scores on a test over lecture content, they divided their students into three groups and found that those who sent or received 0-7 texts outperformed those who sent or received 16 or more texts; neither of these groups differed from students who sent or received 8-15 messages. These results suggest a dose-dependent effect of texting on learning. What is more, they found that students who received or sent longer texts were more impaired on the test relative to those with shorter text messages, as were those who sent or received texts closer together in time (i.e., longer pauses between texts corresponded with higher test scores).

The content of text messages also affects the magnitude of learning interference associated with texting. Texting about course topics does not appear to interfere with learning in a classroom setting, whereas texting about unrelated topics does (Kuznekoff, Munz, & Titsworth, 2015). Kuznekoff et al. (2015) found that students in an irrelevant text message group scored 10-17% lower on a test over the content of a video they watched while texting



than students in a relevant text message group or a no text group, who performed similarly to each other. Students in the irrelevant text message group also took poorer notes than the other two groups and were 70% worse at recalling video content.

Only one study to date has focused on underlying mechanisms that may explain why texting disrupts learning. Wei, Wang, and Klausner (2012) surveyed 190 students about their self-regulation, sustained attention, cognitive learning, and texting behavior in the classroom. Using structural equation modeling, they examined the complex relationships among these factors. Their results indicated that students with better self-regulation skills text less frequently in class and sustain their attention better during class time. Texting during class was also negatively correlated with sustained attention and partially mediated the relationship between self-regulation and sustained attention. Furthermore, classroom texting behavior was related to academic performance and perceived cognitive learning, but this relationship was dependent on sustained attention. Together these results begin to explain how texting during class negatively affects academic success. Not surprisingly, texting seems to draw attention away from classroom material, ultimately making learning it more difficult.

The attention-grabbing effect of mobile phones in classrooms is not limited to texting, however. A simple ring of a mobile phone can distract a whole classroom of students. In a well-controlled experiment, a mobile phone ringing during a video made it less likely that students recorded the interrupted information in their notes and remembered the corresponding information later (End, Worthman, Matthews, & Wetterau, 2010). Thus, even unused mobile phones can inadvertently affect students' classroom learning negatively if they remain on and ring during class time.

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## MEDIA MULTITASKING ON LAPTOPS AND CLASSROOM LEARNING

The evidence that mobile phones can detract from students' learning in the classroom is strong, but laptop computers may have an even greater potential to distract students than phones. Some researchers have argued that the vertical orientation of laptops and the movement and lighting of the displayed text make them inherently distracting (Bhave, 2002; Meierdiercks, 2005; Wickens & Hollands, 2000). As such, laptops may not only affect the user, but may also draw the attention of neighboring classmates. Students report that laptop use by others in the classroom can be disruptive (e.g., Maxwell, 2007), and recent research that has directly investigated the influence of being able to view the laptop screen of a multitasking "peer" has confirmed this impression. Sana, Weston, and Cepeda (2013) created a simulated classroom and placed participants in various locations relative to confederates who multitasked on a laptop during the classroom lecture. They found that scores on a post-lecture comprehension test that contained both factual and application questions were 17% lower for participants in view of multitasking peers than for participants who could not see the laptop screens of other students (Sana et al., 2013; Exp. 2). Importantly, on a post-lecture survey, participants indicated that they were only "somewhat distracted" by the nearby laptop use and that being in view of a multitasker "barely" hindered their learning of lecture material. Therefore, despite the detriments in performance apparent in objective test scores, students were not aware of the extent to which the activities of their classmates had affected their own understanding and retention of lecture material.

Regardless of whether students recognize the negative influence of their peers utilizing laptops, many claim that their own laptop use in the classroom is beneficial to their learning. For example, Demb, Erickson, and Hawkins-Wilding (2004) found that students think laptops support effective study habits and contribute to academic success. However, the results of several empirical studies investigating the relationships between laptops and academic outcomes do not support this widely held student belief. Granberg and Witte (2005), for example, found no

difference in overall course grades between class sections that used laptops and those that did not. Thus, in their study, laptops neither improved nor hindered overall class performance. In a more direct study of the effects of laptop multitasking on classroom learning, Hembrooke and Gay (2003) found that students who use laptops during lectures perform more poorly on subsequent quizzes over lecture material than those who do not. Fried (2008) documented a significant negative correlation between students' self-reported laptop use and how much attention they reported paying to lectures, how clear they found the lectures, and how well they felt they understood course material. Even taking into account factors such as high school rank, ACT score, and class attendance, laptop use correlated negatively with learning of lecture material in Fried's study.

Using a more experimental approach, Carter, Greenberg, and Walker (2017) randomly assigned sections of an introductory economics course at a military academy to one of three conditions. In one condition, students used laptops and tablets as they would in a typical classroom. In the second, "modified-tablet" condition, students used tablets (but not laptops), and the tablet had to remain flat and face-up on the desk at all times, allowing the instructor to ensure that students only used the technology for class-related purposes. The third (control) condition prohibited students from utilizing laptops or tablets for any purpose during class. The researchers compared scores across the groups on an online final exam that included multiple-choice, short answer, and essay questions to determine the effect that the various technology conditions had on students' academic success. They found a statistically significant reduction in final exam scores in both of the conditions that allowed students to use technology in the classroom, regardless of whether the students experienced unrestricted or modified use. Thus, even when students applied their technology use to classroom-related activities, evidence did not support their impression that laptops aid their learning.

Several researchers have investigated on-task (e.g., taking notes or browsing the web for course-related information: McCreary, 2009; Mueller & Oppenheimer, 2014) and off-task (e.g., checking email, surfing the Internet, playing games: Fried, 2008; Ravizza, Hambrick, & Fenn, 2014) laptop use in the classroom. Not surprisingly, the extent to which students apply their laptops to class-related versus distracting activities matters, with self-reported off-task laptop use predicting lower semester grade point averages above and beyond other potentially confounding factors like motivation, organization, and self-regulation (Gaudreau, Miranda, & Gareau, 2014).

One explanation for the impaired comprehension of and memory for lecture material that accompanies laptop use is that insufficient allocation of attention to the to-be-learned information results in inadequate encoding (e.g., Broadbent, 1958; Craik & Lockhart, 1972; Sana et al., 2013, Exp 1). Thus, it is not surprising that off-task laptop use may be particularly detrimental to student success. In Kraushaar and Novak's (2010) Spyware study, students typically opened twice as many browser windows for "distractive" activities than for "productive" activities. Students whose ratio of distractive to productive browser windows favored distraction scored lower on homework, quizzes, projects, and exams than their "productive" peers, resulting in worse overall course grades compared to the students whose ratio favored productive activities. Furthermore, other researchers have shown that the length of web browsing sessions during class correlates negatively with overall course performance (Grace-Martin & Gay, 2001) and that students with higher intellectual ability increase their self-reported course-unrelated Internet use across time despite this use being associated with lower test grades (Ravizza et al., 2014). Interestingly, when Hembrooke and Gay (2003) classified their students into "browsers" (those who spent the majority of their online time on course-unrelated content) versus "seekers" (those who spent the majority of their online time focused on course-related content), seekers actually spent more time on class-unrelated pages than browsers. That is, when seekers went off task, they spent a large amount of time with the unrelated content, leading these authors to suggest that "browsing style" may be a more important factor in determining the effect of laptop use on academic performance than on-task versus off-task laptop behaviors.

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## MANAGING STUDENTS' CLASSROOM MEDIA MULTITASKING

Ample evidence points to the detrimental effects media multitasking, and particularly media multitasking that is unrelated to course content, exerts in classroom settings. Yet, both students and faculty may promote the integration and use of technology in classrooms. Mobile phones can support applications such as Poll Everywhere (<https://www.poll Everywhere.com/>) or other types of classroom-response-system platforms. Advocates of in-class laptop use argue that notetaking may be more efficient on laptops and that students may find it easier to convert typed notes than hand-written notes into outlines (McCreary, 2009). A related argument is that taking notes on a laptop tends to be faster and neater than handwriting those same notes (McGaugh, 2006). Empirical investigations comparing laptop-based notetaking to taking notes by hand, however, frequently suggest that typing notes on a laptop may undermine student learning (Mueller & Oppenheimer, 2014). Using a laptop to take notes may encourage students to simply transcribe a direct dictation of the instructor's lecture rather than summarizing the main points and consolidating the information in one's own words (Chen, 2006; Maxwell, 2007; McGaugh, 2006; Yamamoto, 2007; but see also Murray, 2011). Further, proponents of the haptics of writing claim that typed letters and symbols are less recognizable than those that are handwritten (Longcamp, Boucard, Gilhodes, & Velay, 2006), and many researchers argue that the physical formation of letters and the comparatively laborious process of handwriting facilitate the development of mental representations involved in learning new material (e.g., Mangen & Velay, 2010). Thus, the costs to active processing and learning that accompany notetaking on a laptop may overshadow the practical efficiency gained when using this approach.

Another reason for allowing or integrating technology in the classroom centers on student satisfaction. Driver (2002) found that students were more satisfied with a course and with group projects when instructors assigned web-based activities on laptops. In a 2015 survey of 675 American college students from 26 states, 89% of respondents did not think that instructors should ban technology in the classroom (McCoy, 2016). Although greater use of technology in the classroom is not always associated with increased student satisfaction (Wurst, Smarkola, & Gaffney, 2008), Driver (2002) is not alone in finding that students enjoy using technology for academic purposes; students believe that technology enhances their ability to pay attention and increases their engagement with class topics, particularly when instructors use technology strategically (Demb et al., 2004; Zhu, Kaplan, Dershimer, & Bergom, 2011). Students' self-perceived engagement may be genuine, and this sense of student engagement and active learning in classrooms may be more responsible for the changes in student satisfaction that accompany the utilization of laptops than the laptop use, itself. Nonetheless, the increased engagement associated with laptop-based assignments and activities may be possible to achieve without the utilization of laptops or other forms of technological media and, therefore, without introducing opportunities for distraction (Price, 2011).

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## SUGGESTIONS FOR INSTRUCTORS

After reviewing the literature on media multitasking and learning, the question arises: "What should instructors do? Should instructors implement technology policies in the classroom or should students be responsible for making decisions about their learning?" Because wireless classrooms are a relatively new phenomenon, the research literature addressing these issues is sparse. On the 2015 McCoy (2016) survey, 71% of the large cohort of college students sampled across the United States indicated that "most" of their instructors have policies about the use of technology in the classroom. Just over half of the surveyed students (52.8%) viewed policies limiting the use of digital devices as helpful, but, again, 89% also said that instructors should not ban technology. At the same time, more than 92% of the sample admitted that, on a typical day, they use technology for non-classroom-related activities such as texting, making phone calls, emailing, surfing the Internet, Tweeting or other social networking activities at least once.

As noted, students tend to underestimate their off-task technology use in classrooms (Kraushaar & Novak, 2010) and they view their technology use as less disruptive to their own and to others' learning than objective measures indicate (Demb et al., 2004; Sana et al., 2013). Consequently, there may be merit in instructors' being thoughtful and deliberate about technology in their classrooms, possibly even limiting or prohibiting students' technology use during class time. Approaches to technology can take several forms. Several researchers and educators have offered advice for how to integrate technology wisely (Levine, 2002; Willingham, 2010; Zhu et al., 2011), proposing ways to increase faculty-student interactions and in-class participation using laptops (e.g., Fitch, 2004; Partee, 1996; Stephens, 2005). Price (2011) advocated establishing highly engaging classroom environments that reduce the likelihood that students will turn to technology and fall prey to its inherent distractions. Some instructors with concerns about the disruptive nature of technology have created laptop- or technology-free zones (Aguilar-Roca, Williams, & O'Dowd, 2012; McCreary, 2009) or have implemented explicit policies or banned its use altogether (Maxwell, 2007; Zhu et al., 2011).

Perhaps because the direct academic applications of mobile phones are less extensive and less obvious than that of laptops (i.e., students may be more likely to use phones than laptops for activities not related to coursework), some empirical research and commentary have focused on the effects of implementing mobile phone policies or systems for phone use designed to help students make better decisions in the classroom (Berry & Westfall, 2015; Burkholder, 2017; Katz & Lambert, 2016; Lancaster & Goodboy, 2015). Katz and Lambert (2016) investigated their implementation of an incentive system that offers students one point of extra credit for each class period they leave their cell phones on the instructor's desk. They found that, with this extra credit system in place, the 104 students who participated in the study surrendered their phones, on average, 18 out of 20-23 class meetings. Additionally, they documented a significant correlation between how often students left their phone on the instructor's desk and the students' grades on five exams across the course of the semester. Burkholder (2017) implemented this same system in his courses and asked students their impressions of the extra credit policy. He found that "nearly everyone" (88% in one class and 99% in another) chose to abandon their phones during class even though the amount of extra credit he offered amounted to less than 2% of the overall course grade. He also reported that, although his students did not believe that phones are distracting, 69% indicated that the extra credit system had a positive effect on their learning, and 80% said they would like other professors to enact a similar approach.

One of the current authors (TL) has modified this approach in her classes. She introduced an optional "no technology club." Students join the club at the beginning of the semester, signing an agreement that says they will turn off their mobile phones at the start of each class and leave their laptops stored unless a specific class activity calls for their use (e.g., discussing a reading posted online or working on a collaborative assignment in the room). Those who join earn five points of extra credit at the end of the semester if they remain an active member. The instructor explains that she may ask students who opt not to join the club to sit in a laptop zone in the classroom. This has actually never been necessary because every student in every class to date has opted to join the "no technology club" and has maintained their memberships across the entire length of the course. Monitoring participation is extremely simple, given that students' signed contract earns them five extra credit points, and this approach eliminates distractions due to both mobile phones and laptops. Although students have occasionally forgotten and have accessed their phones during class, one reminder has always been sufficient to eliminate the behavior for the remainder of the semester in all students enrolled. Additionally, in contrast to the concerns former students sometimes voiced about the mandatory technology ban the instructor implemented prior to the club, she has received no complaints about technology policies since introducing this option to students.

In other courses, we have simply recommended or asked students to refrain from technology use in the classroom. In these instances, we frequently offer a brief in-class explanation of the literature that documents how distracting

technology can be in classroom settings followed by posting several readings (some primary and some secondary sources) on our classroom management system about texting during class and the value of taking notes by hand versus on a laptop. We have never monitored how often students read these articles or whether that influences their technology-related classroom decision-making. As a result, we do not know whether we are offering students too many or too few resources to influence their decisions about technology. However, Lancaster and Goodboy (2015) conducted an experimental study of students' attitudes toward classroom cell phone policies and found that providing too many arguments when introducing those policies resulted in more negative student attitudes towards them. Additionally, student attitudes towards the policies predicted their compliance with the rules; those who viewed the policies more negatively were more likely to use their phones in classes that prohibited them. This study raises interesting questions about the best way to present technology recommendations or policies to students, questions that warrant further research given that this is the only study to investigate the issue to date. It certainly suggests that it is important for instructors to not only think carefully about their policies but also to be wise in how they present those policies to students.

Beyond providing research evidence and information to students to support classroom policies, we have also used demonstrations to show students how disruptive dividing their attention can be. (See Gingerich & Lineweaver, 2011 or Lineweaver, Gingerich Hall, Hilycord, & Vitelli, accepted pending revisions, for a more detailed description of how we attempt to make students aware of the decrements in attention that accompany attempting two tasks simultaneously.) Reed and Pusateri (2007) introduced an example that consistently works well for giving students direct experience with the perils of multitasking. We divide our class into two groups sitting on opposite sides of the classroom. Group 1 attempts two tasks simultaneously, one visual and one auditory. Group 2 completes only the auditory task and watches Group 1. Group 1 is consistently both slower and more error-prone on the auditory task (the task that the two groups share in common). We then reverse the group assignments so that everyone not only experiences the challenges associated with multitasking but also has a chance to observe the multitasking effect on others. This demonstration takes only a few minutes and quickly shows students that they are not as efficient at completing two tasks simultaneously as they previously believed.

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## CONCLUSION

As a relatively new issue, technological media use and the associated "multitasking" (or more aptly, task switching) that accompanies it in college classrooms is an under-researched, yet highly relevant, topic for both new and experienced instructors. As we outlined above, some limited research addresses, but much work remains to be done to determine, best practices as applied to: 1) integrating technology into classrooms without introducing distractions; 2) building engaging classroom environments that do not involve technology; 3) implementing well-supported and well-reasoned technology policies; 4) encouraging students to accept and follow these policies; and 5) helping students reach their own good decisions about technology use. While awaiting the scientific evidence to help guide their decisions about technology and media multitasking, we recommend that instructors think flexibly about their goals, tailoring their approach to each particular course, to each specific group of students, or to emerging trends in technology use across time, as all of these factors may call for unique ideas and solutions aimed towards building the most productive and effective learning environment for our collegiate scholars.

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# STUDENT RESPONSE SYSTEMS: A MINDFUL APPROACH

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## INTRODUCTION

We have come to the realization that the more we learn, the more complex the world becomes. A perfect example of this is our careers as educators. For the first six years of teaching in higher education, the first author mimicked the professors that he admired the most. His lectures contained both breadth and depth and he used real-world examples and humor to engage the students. His student evaluations of teaching were fine, but something did not feel right. He tried to enthusiastically feed his students every ounce of knowledge he had, yet the non-verbal feedback that he would regularly receive from them were glassy eyes and dazed looks. He was also unimpressed with their overall academic performance. They should be doing better, is what he would commonly say to himself. Finally, he asked the crucial question: Is there another way to teach that will truly engage students?

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## IDENTIFYING THE CHALLENGES

Two distinctly different challenges began to present themselves during my search. The first challenge focused on *student perception*. The second addresses the concept of *mind-wandering*. The irony and perhaps advantage, is that both are very much related and therefore may lead to complementary instructional approaches.

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## PERCEPTION

Iwamoto, Hargis, and Vuong (2016) found that students' mindsets were an essential factor in their abilities to perform at a high academic level. Students who adopted an active and effortful learning approach were found to have higher levels of classroom engagement and higher examination scores than those who did not. This type of mindset is typically a learned behavior and there are scaffolding strategies, which can be employed to capitalize on this phenomenon. The challenge is that frequently first year college students have formed their personal theories about learning before they graduate from secondary education systems (Simpson, Stahl, & Francis, 2004). By the time a student enters their post-secondary classroom, they would most likely be entering with learning habits that have been conditioned, reinforced, and influenced from when they first began formal education. Often these habits are lower level, action/reaction processes, which produced success, as measured by grades, now may be insufficient and unsustainable for the complexities of advanced concepts. Therefore, there is commonly a misalignment between the formal, linear method of processing information and the higher level, critical thinking and questioning, which many post-secondary programs require.

More research has been addressing the critical nature of twenty-first (21<sup>st</sup>) century skills (Trilling & Fadel, 2009). Frequently, these skills address four major pillars of communication, collaboration, critical thinking and creativity. How 21<sup>st</sup> century students learn and perform academically is directly related to their personal belief system. Their personal belief systems serves as their filter in how they interpret their academic responsibilities in and out of the

classroom (Thomas & Rohwer, 1986; Nist & Simpson, 2000; Simpson & Nist, 2002). Iwamoto, Hargis, Bordner, and Chandler (2017) discovered that students in higher education have high self-confidence, which reduces their level of anxiety, but this level of self-confidence did not motivate them to academically self-regulate. Zimmerman (1989) defined self-regulated learning strategies as actions and processes directed at acquiring information or skill that involve agency, purpose, and perceptions by learners. Students were observed exhibiting maladaptive and counterproductive behaviors like procrastination and disengagement in and out of the classroom (Iwamoto et al., 2017). Two studies in particular obtained data that pointed toward the idea that 21<sup>st</sup> century college students possess an external locus of control and although lecture-based pedagogy/andragogy is not preferred, it is what students are familiar with and expect (Iwamoto et al., 2016; Iwamoto et al., 2017). This behavior led to the next question which is, how do you blend student and teacher-focused pedagogies into a similar instructional approach and at the same time attend to research-based effective practices?

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#### MIND WANDERING IN THE PRESENCE OF STRESS, CONFUSION AND FRUSTRATION

The second challenge of mind wandering could be classified under a broader term of distractions. Distractions are an ongoing challenge especially among college students and the increased number of physical and mental activities available to them. As we progress through the 21<sup>st</sup> century, distractions continue to be a prominent problem when compared to previous generations; however, the types of distractions are changing in form, frequency and perhaps intensity. For example, mobile devices have led professors to create technology policies in their academic syllabi, resulting in some banning these devices during class sessions (de Vise, 2010). This was then followed by a push to remove the banning of technology in the classroom (Lang, 2016). The reasons for banning devices vary, but the underlying belief is that attempting to focus on more than one task at a time has a detrimental effect on other tasks, specifically, learning (Fried, 2008; San, Weston, & Cepeda, 2013). Most researchers agree that the distraction is seldom a device, but most often, it is the pedagogy, which drives students toward or away from distractions. An interesting twist is that distractions do not have to involve the external environment. Distractions can also happen internally due to how our brain has been evolutionarily wired. This concept of distraction is known as mind wandering.

Through fMRI (Functional Magnetic Resonance Imaging) research, it was discovered that there is an area of the brain that is active when we are in a resting state. That area is known as the default mode network (DMN). The DMN consists of “areas in the dorsal and ventral medial prefrontal cortices, medial and lateral parietal cortex, and parts of the medial and lateral temporal cortices” (Sheline et al., 2009, p. 1942). When we are in a resting state, the DMN is highly active and creates self-generated cognitive narratives about our past and plans for our future (Andrews-Hanna, 2012). These narratives are self-referential in nature and primarily focuses on survival-salient perceptions of you and of the world (Sheline et al., 2009). This is because “when an event is flagged as negative, the hippocampus makes sure it is stored carefully for future reference; one’s brain is like Velcro for negative experiences” (Hanson & Mendius, 2009, p. 41). This served an evolutionary purpose for our ancestors. Running simulations (ruminating thoughts) of past events promoted survival, as it strengthened the learning of successful behaviors by repeating their neural firing pattern. Simulating future events also promoted survival by enabling our ancestors to compare possible outcomes and to mentally prepare for immediate action (Hanson & Mendius, 2009). One’s DMN is an evolutionary process developed over time to promote survival. The challenge is that one’s perceived threats in the 21<sup>st</sup> century are vastly different than the threats experienced by our distant ancestors. Yet, our brain functions in the same way that it did centuries ago.

One's DMN continues to be active for most of one's waking moments and takes minimal effort to operate. We unconsciously allow our mind to wander which leads to thoughts about "what is not going on around you, contemplating events that happened in the past, might happen in the future, or will never happen at all" (Killingsworth & Gilbert, 2010, p. 932). A failure to effortfully focus will allow the DMN to activate and that may cause internal emotional distractions that can interfere with a student's academic performance (e.g., learning).

Killingsworth and Gilbert (2010) found that people were less happy when their minds were wandering compared to states when wandering was minimized. This unhappiness and the ruminating thoughts of our past and future tends to increase one's level of stress. Although some degree of stress has been shown to have a positive relationship with academic performance, too much stress, confusion, and/or frustration leads to a decline performance (Baker et al., 2013). This phenomenon is known as the Yerkes-Dodson Law (Yerkes & Dodson, 1908). Through the Yerkes-Dodson Law it was discovered that there is an optimal zone for learning. This is when stress builds up to the point where one becomes motivated and to an extent feels threatened by the stress. This focuses the mind due to the increase in adrenaline and cortisol in one's brain (Cozolino, 2016). The challenge comes when stress becomes too high and the increase in adrenaline and cortisol activates one's flight or fight system. At that point, one becomes impulsive and is focused on removing the threat versus persevering through it (Siegel, 2010; Cozolino, 2016). The stress from uncontrolled self-reference as well as the context of a student has the possibility of moving the student out of the zone of optimal learning and into an overwhelmed state where learning becomes extremely challenging. So, it seems that the driving question to address the challenge of mind wandering [into mindful] would be how do we keep our students within the zone of optimal learning?

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## MINDFULNESS

Mindfulness is the practice of focusing your attention on the present moment and accepting the here and now without judgment. The concept is a form of moment-to-moment awareness (Davis & Hayes, 2011). Mindfulness is rooted in Buddhism, but its practice of nonjudgmental moment-to-moment awareness can be found in most religions through some form of prayer or meditation technique (Davis & Hayes, 2011). One of the many benefits of mindfulness is that by focusing on the here and now, many people reported not thinking of their past regrets or worrying about their future. They were also able to connect with people and not as concerned about their success and self-esteem (HelpGuide, n.d.). Neuroscience explains how a pedagogical approach that includes mindfulness can positively influence student perception as well as helping to maintain their presence in the zone of optimal learning.

The DMN becomes active when our mind is in a restful state. In order to suppress and reduce the activation of the DMN, one needs to focus on a direct experience (the here and now). By doing so, two major parts of the brain are activated. The parts are the insula, which is the region of the brain that controls bodily sensations; and the anterior cingulate cortex, which controls the switching of attention (Farb et al., 2007). With these two parts of our brain activated, one can experience sensations in real time (the here and now). This mindful practice focuses or attention on our present senses and not our past, future, ourselves, or others. Experiencing the world directly enables more sensory information to be processed and subsequently perceived. This also allows a person to be psychologically flexible when responding to the world because one is not imprisoned by the narratives of our DMN (Farb et al., 2007). Only when we are present in the here and now can we take action and learn deeply and effectively (Cozolino, 2016). Perhaps attempting to guide students' attention to the present, capitalizing on their information processing (Atkinson & Shiffrin, 1971) is to provide engaging opportunities with appropriate ways to provide feedback, initiate discussion and reflection.

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## STUDENT RESPONSE SYSTEMS

How, therefore, does an instructor create a student-centered learning opportunity where the student experiences and practices mindful learning? One approach is by incorporating student response systems (SRS) as one component of creating an active, engaging learning experience.

An SRS is an umbrella term used to classify a wide variety of methods that allow students to share their ideas. Student response systems can also be known as audience response systems, classroom response systems, personal response systems, or a subset of hardware (e.g., small remote devices called clickers). SRS can be deployed with or without using technology; synchronous or asynchronous; and anonymous or self-identified. SRS examples from simplest to more complex and enhanced use of educational technology could include:

- Raising Hands/Fingers, where students hold up fingers or hands representing their response - if anonymity is desired, students can be asked to close their eyes;
- iClicker (<https://www.iclicker.com/>), students respond to questions using an iClicker device;
- Four Color Quadrant ([https://uminntilt.files.wordpress.com/2014/06/colored-abc\\_card.pdf](https://uminntilt.files.wordpress.com/2014/06/colored-abc_card.pdf)), students respond to questions holding a piece of paper with four color quadrant representing their responses;
- Plickers (<http://www.plickers.com>), students hold pieces of paper, which contain QR codes which the instructor scans remotely using a mobile device;
- Polleverywhere (<http://www.polleverywhere.com>), free for less than 40 responses;
- Answer Garden (<https://answergarden.ch>), for larger class enrollments;
- Twitter ([www.twitter.com](http://www.twitter.com)), open ended micro-blog of 280 characters;
- Goformative (<https://goformative.com>), real time monitoring of student responses, which could include graphical representations;
- Slido (<https://www.sli.do>), allows students to ask questions;
- Kahoot® (<https://getkahoot.com>), a gamified SRS, where points are provided based on the time it takes to produce a correct response; and
- Google Slides, which allows students to post questions to each slide viewable only by the instructor.

There are now many free and low threshold methods to offer SRS using technology (Yee & Hargis, 2011; Galal et al., 2015; Iwamoto et al., 2017). The power of these approaches is multi-directional, in that instructors can view the responses as formative assessments and offer real time remediation decisions; and students are able to view how they are understanding the concepts relative to their peers. Musselman (2012) reiterated that the main idea behind the development of SRS is to create a conversation between the students and their instructors by providing a clear way of communicating in an efficient, meaningful way. SRS are designed to transition teacher-focused pedagogy into

an interactive and formative assessment tool that would help students engage and process information and allow instructors to assess, measure and evaluate the learning process. In addition to these pedagogical advantages, SRS meets the needs of 21<sup>st</sup> century students, especially in the areas of communication, collaboration, and critical thinking.

Traditional, didactic methods of instruction (lecture-only classes) may have limited success to the culture of today's students (Musselman, 2012). Twenty-first century students are comfortable with technology; they learn on their own and satisfy their intellectual curiosity with tools like Google, Bing, and YouTube (Brown, 2006). They typically seek quick and succinct answers to address their immediate problem. This new way of learning counters the traditional factory model of education where students are herded into large buildings and provided large stocks of knowledge for later use, although typically forgotten (Newell, 2003; Brown, 2006).

To prepare our students well, along with facilitating content within a context, instructors could assist students in "learning how to learn," which requires the ability to be mindful, think, consider, reconsider (metacognitive strategies) and ask/receive feedback in a timely manner. As the world-of-work is constantly changing and most students will be preparing themselves for a job that may not be invented yet. Classic behavioral research conducted by B.F. Skinner in 1938 empirically showed the importance of immediate feedback. Learning occurred quicker and stronger when feedback was timely and aligned. Therein lies the strength of SRSs. Students engage in real-time dialogue and receive real-time feedback about the content they are learning at the time, which creates stronger scaffolding, which can produce a stronger conceptual connection. Because everything is occurring in real-time, students are engaged and focused on the here and now. This suppresses the DMN and students find themselves unconsciously and effortlessly practicing mindfulness while actively engaging in their learning.

"Student response systems have been hypothesized to improve student learning through three broad categories, which include improving the following: (a) student engagement; (b) student feedback; and (c) teacher feedback" (Bartsch & Murphy, 2011, p. 25-26). Synder (2003) found that SRS increases student engagement because it allows all students to engage actively during a lecture that prevented passive learning often typical in a lecture setting. Stowell, Oldham, and Bennett (2010) added that students who were too anxious or shy to verbalize during class felt more comfortable using a SRS to engage in class discussions due to the SRS's anonymity. Ulrich (2006) observed students being more attentive in classes because they knew a question would be asked that they could respond. Iwamoto et al. (2017) observed a similar behavior where students would prepare prior to class because they knew Kahoot® gamification SRS would be offered as an integral part of the learning experience.

Student engagement has been cited as having an overall positive correlation with college achievement (Bartsch & Murphy, 2011). It has also been identified as being a critical component of student success (Kuh et al., 2008). Bartsch and Murphy (2011) found that students who utilized a SRS in class significantly scored higher when compared to students who did not. Similar results were found in a 2017 study where students who utilized the Kahoot® SRS scored significantly higher during the mid-term examination when compared to students who did not (Iwamoto et al., 2017). Hatch et al. (2005) found that 92% of students surveyed agreed that the SRS helped them understand what they did and not know. This resulted in clear and real-time feedback, which is the goal of a formative assessment.

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## CONCLUSION

Through personal observation and an extensive literature review, it has become evident that 21<sup>st</sup> century students have much more access to information due to technological advances when compared to previous generations. For instance, 21<sup>st</sup> century students have many different ways to access information when compared to how learning took place even one generation ago. Real-time information is expected and questions should be answered with a few clicks on a mobile device. The pace of information sharing is increasing and instructors are discovering that if they do not adapt, students identify their own way to access and interact with conceptual frameworks.

The need for immediate gratification poses a challenge to an educational system based solely on static, one-way lectures. A student's past academic experiences shape his or her perceptions about learning. The fact that there are so many opportunities for students to be distracted poses another level of stress that did not exist a generation ago. Neuroscience has shown that even when one's brain is in a restful state, the DMN gets activated and thoughts of one's future and past begins to flood our minds.

These are the challenges that 21<sup>st</sup> century teachers are faced with. Instructors are battling Google, Bing, YouTube, Facebook, Instagram, Twitter, among other distractors. How do we keep students engaged in the here-and-now of our classroom? One solution is the incorporation of student response systems (SRSs), which has been shown to engage students in real-time. This anonymous interaction has the potential of engaging the shyest of students (Stowell, 2010). Because of anonymity, students find discussions safe so they can express their true thoughts versus what they think the group would agree with. Another benefit in how an SRSs improves learning is that instructors receive real-time feedback that can be used as a method of formative assessment. This real-time interaction between teacher and students increases learning by keeping students in the here-and-now, which is the only time when the act of learning can take place. It is common to hear students state that SRSs are found to be enjoyable, maintains their interest, and encourages participation (Bartsch & Murphy, 2011). Because students find SRSs to be engaging, they allow themselves to be present and in the moment. This mindful act quiets mind wandering and promotes learning in a fun and engaging manner.

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CHAPTER  
7

# THE IMPACT OF TECHNOLOGY ON HOW INSTRUCTORS TEACH AND HOW STUDENTS LEARN

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## INTRODUCTION

The relationship between technology, teaching and learning is a complex one. Just a few of the factors that contribute to these complex relationships include: Instructors' confidence and competence using technology for teaching; the kinds of technology that are available in a particular learning context; institutional policies on how money is spent on technology and what kind of technology is licensed or purchased; and whether students bring their own devices or use technology provided by their learning institution (Becker, Gereluk, Dressler, & Eaton, 2015; Hourigan & Murray, 2010).

The push to add computers to the classroom first emerged in the 1980s and is now common in North American classrooms (Christensen, Horn, & Johnson, 2017). However, the use of technology is no longer limited to high-income or high-resource countries, but also includes developing countries (Bhuasiri, Xaymoungkhoun, Zo, & Rho, 2012; Glewwe, Hanushek, Humpage, & Ravina, 2011; Kremer, Brannen, & Glennerster, 2013). In other words, the use of technology for teaching and learning is now a worldwide phenomenon at every level of education.

In this chapter, I will examine the impact of technology on how instructors teach, as well as its impact on how students learn. I will discuss how technology might evolve for teaching and learning and conclude with strategies for how instructors can approach the adoption and integration of technology into their teaching practice.

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## IMPACT OF TECHNOLOGY ON HOW INSTRUCTORS TEACH

It is not enough for a school district or an institution to simply acquire a new technology and expect teachers to immediately begin implementing it (Jacobsen & Lock, 2004; Kremer et al., 2013). New technology requires teachers to think deeply about how they will use it to enhance learning, and this kind of deep thinking requires time and the ability to engage in long-term reflection on their practice, in order to puzzle through how technology can make the lives of students better. Improving the lives of our students is, after all, one of the motivators for why we teach (Jacobsen & Lock, 2004). However, in today's digitized and connected world, is not enough for instructors to teach, or even think about teaching, in the ways that they themselves were taught (Jacobsen & Lock, 2004). Instead, teachers think ahead to a time when the students they are teaching will be using technologies far beyond what we have today.

This kind of blue-sky thinking is juxtaposed with the frantic nature of an instructor's day-to-day teaching schedule where there is rarely enough time to pause and engage in deep reflection. Instructors face a number of challenges when it comes to adopting and integrating technology effectively. These include making use of technology in a meaningful and relevant way, addressing increased demands on time and dealing with technology barriers beyond

the teacher's control. In the sections that follow, I will address each of these as key considerations for how technology impacts teaching.

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#### USING TECHNOLOGY IN A MEANINGFUL WAY

It is not enough for technology to be available or installed on school computers. It must also be relevant to one's learning goals and objectives, and engaging for learners to use (Becker, Gereluk, Dressler & Eaton, 2015). Various models have been developed to help educators conceptualize how to integrate technology effectively into their teaching practice. Among the more notable is the TPACK (Technology, Pedagogy and Content Knowledge) model (AACTE Committee on Innovation and Technology, 2008; Mishra & Koehler, 2006, 2009; Mishra, Koehler, & Kereluik, 2009). This model challenges teachers to incorporate new tools, platforms, software (Technology) with their knowledge of a particular subject area (Content) and their knowledge of how to teach that subject area (Pedagogy). At the heart of it is the notion that technology does not stand apart from the content or the pedagogy, but must be integrated in a purposeful way (Snookes & Barker, 2009).

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#### ADDRESSING INCREASED DEMANDS ON TIME

Incorporating technology into one's teaching practice involves a complex set of tasks that put additional demands on a teacher's time. These tasks include: Testing the technology to determine its appropriateness; ensuring that privacy settings align with institutional protocols around student privacy; introducing the technology to the students and explaining how and why it is relevant to student learning; and then working with students to show them how to use the technology for learning. It can take longer for a teacher to prepare lessons that incorporate technology effectively and educators need to be mindful to avoid becoming frustrated with this additional requirement of preparation time (Becker et al., 2015; Dragon, Peacock, Norton, Steinhauer, Snart, Carbonaro, & Boechler, 2012; Kang, 2014). After implementing the technology, the teacher might also assume the role of technical troubleshooter, helping students when the technology does not perform as expected. There is no question that integrating technology into learning is time-consuming.

In addition to demands on preparation and classroom time, teachers may also experience an increased administrative or managerial load with tasks such as electronic content management (e.g., keeping a log of student sign-in information) (Hourigan & Murray, 2010; Kang, 2014). As teachers increase their use of technology for learning, so too must they increase their management of that technology. This increase in administrative load is likely to become the norm for teachers in coming decades, as the management of technology will become a normal aspect of learning management for students.

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#### DEALING WITH TECHNOLOGY BARRIERS BEYOND INSTRUCTORS' CONTROL

Technology barriers beyond instructors' control are noted as being one of the primary reasons teachers either do not or cannot incorporate technology effectively into their practice (Kim, Kim, Lee, Spector, & DeMeester, 2013). These barriers include technology that is outdated or difficult to use, along with Internet connectivity issues. Among educators who use and understand technology for learning there is a saying that the technology is effective only when it becomes invisible. In other words, there is a correlation between the technology failing and learning becoming less engaging and effective. The moment there are technology issues, there are learning issues.

These issues may be exacerbated for teachers in rural and remote areas, who may have more limited access to both the technology itself, as well as to reliable connectivity, which may include telecommunications infrastructures such as copper or fiber optic networks that deliver Internet services to a region, community, institution or dwelling, as well as WIFI connectivity (Becker et al., 2015; Eaton et al., 2015; Howley, Wood, & Hough, 2011). When these kinds of barriers persist, teachers may lack the motivation or resources to invest time and energy trying to incorporate technology into their own teaching practice. In cases like this, the barriers may need to be addressed at the school or district level, as there may be deeper policy factors at play.

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## IMPACT OF TECHNOLOGY ON HOW STUDENTS LEARN

Twenty-first century students are often referred to as digital natives, a term coined by Prensky (2001) at the turn of the millennium. There has been an (erroneous) assumption, that because students have grown up with technology, they automatically know how to use it for learning. Research has shown that is not always the case (Genç & Aydin, 2010; Hourigan & Murray, 2010, Stracke, 2007). What we know today is that students need explicit and hands-on instruction not only on how to use technology for learning, but also to understand what purpose the technology serves in terms of their learning. In other words, students still need their teachers to guide them in order to learn how to use new technology and how to relate it to the content they are covering in their classes.

Students excel when they are engaged in active learning (Freeman et al., 2014) and technology can offer a way for that to happen, provided that students are helped along with explicit instruction and given time to learn the technology for themselves. One way student can engage in active learning using technology is through online content creation (OCC), through activities such as blogging, tweeting or sharing content via social media (Brown, Czerniewicz, & Noakes, 2016; Hourigan, & Murray, 2010). It is important to remember that students who have an interest in the subject matter are more likely to have an interest in using technology to help them learn about that subject (Genç & Aydin, 2010). That is, the more students are interested in learning about a topic, they more likely they will engage with technology.

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## STUDENTS AS CREATORS OF CONTENT

When students are mere consumers of content, they are understandably less engaged (Brown et al., 2016). Technology offers students the opportunity to move away from being consumers of knowledge, to creators of their own content (Brown et al., 2016; Hourigan & Murray, 2010). When that happens, students can demonstrate not only what they have learned, but how they make sense of what they have learned. Technologies that allow students to create and learn in real time create a collaborative relationship between the teacher and the learner (Aoki & Molnar, 2010). Examples of these real-time technologies include Google Docs, Skype, VoiceThread and others.

In addition, real-time mobile technologies provide students with even more flexibility in terms of learning anywhere at any time (Brown et al., 2016; Chinnery, 2006; Eaton, 2010; Kukulka-Hulme, 2009). The notion of learning anywhere, anytime is not restricted to desktop computers. It extends to mobile technologies such as cell phones and tablets. Mobile learning technologies can provide students with opportunities to incorporate social media and other Internet applications into their learning in innovative ways, such as social networking for learning or blogging, for example (Brown et al., 2016; Hourigan & Murray, 2010). Brown et al. (2016) cautioned, however, that such opportunities may be limited to those of high socio-economic status who can afford data plans and other ways of accessing these learn-anywhere opportunities. That aside, mobile technologies can offer students an opportunity to

take photos, write, create and share their knowledge outside of classroom walls in ways that engage and excite them (Brown et al., 2016; Hourigan & Murray, 2010).

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### PREVENTING COGNITIVE OVERLOAD

Given the prevalence of “learn-anywhere” technologies such as smart phones or portable computers (Chu, 2014) and the likelihood that this trend will continue, teachers must be mindful of striking a balance between the use of technology and the cognitive load on students. If the technology itself becomes too demanding, student learning can actually decrease (Chu, 2014; deHaan, Kuwada, & Ree, 2010). Thus, it is very important for teachers to take the time to guide students’ learning and to engage them in ongoing dialogue about what they are learning, as well as reflection about how they are changing and growing as a result of what they are learning. This balance might be achieved through formative assessment that helps students to understand what they are learning at different stages of the learning process (Chu, 2014).

It is also appropriate for teachers to engage students in reflective dialogue about how the technology is facilitating learning. This helps students develop more meta-cognitive awareness about their own learning (Lock, Kessy, & Eaton, 2017). Students will need guided instruction on how to use these tools, but once they know they are supported by their teacher, their confidence levels can increase and they can become more autonomous and self-directed. For example, students might interact with one another in a real-time virtual environment such as Google docs. At first, the teacher supports the students’ learning by showing them how to use Google docs for the purposes of the learning task and setting up expectations for learning and productive interaction between students, but after the students have learned the basic functions of the technology and have become accustomed to the social and learning norms established with the teacher present, students can then move to learning more independently using Google docs (Lock et al., 2017).

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### LOOKING AHEAD TO WHAT TECHNOLOGY MEANS FOR LEARNING IN THE FUTURE

At the beginning of this chapter, I contended that educators of today are called upon to think ahead to a time when students will be using technologies far more advanced than what is commonly available in most classrooms today. It is quite probable, for example, that virtual reality can be, and will be, used for learning in a variety of contexts (Garcia-Ruiz, Edwards, El-Seoud, & Aquino-Santos, 2008; O’Brien & Levy, 2008). At the moment, technologies such as virtual reality are too expensive and complicated to incorporate into most classrooms, but given time, the costs will come down, making it more accessible and attractive.

Educators of today need to be prepared for a reality of tomorrow where technology such as virtual reality will be normal. What will remain important through all of that, however, is for teachers to understand, and be able to communicate, how technology relates to learning and to specific content. The teacher will continue to be the bridge between technology and inspiring student learning.

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### CONCLUSION

Twenty-first century teachers are called upon today to have combined expertise that involves knowing what to teach, how to teach it and how to engage their learners in a meaningful way using a variety of ever-changing tools at their disposal. It also requires them to be responsive and adaptive when the technology may not work as expected or becomes unavailable. Some of challenges that teachers face today in terms of incorporating technology into

learning such as setting aside additional time; being aware of cognitive overload and engaging students in formative conversations that help them to develop self-regulated learning skills. Whether teachers of the future will face these same challenges remains to be seen. What we can count on this is that real-time learning technologies will become more prevalent and teachers will be called upon to incorporate their combined expertise into an ever-changing landscape of learning.

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# EDUCATIONAL TECHNOLOGIES THAT INSTRUCTORS USE TO TEACH STUDENTS

CHAPTER  
8

# DESIGNING GROUP WORK IN BLENDED LEARNING ENVIRONMENTS

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## INTRODUCTION

The purpose of this chapter is to discuss a framework that can guide the development of promising learning designs intended to promote group work and collaborative knowledge building in higher education, specifically in blended learning environments. Today's learners need newly designed learning experiences leveraging collaboration technologies (Vaughan, 2014). Learners expect to work collaboratively and experience engaging learning experiences (Dunlap & Lowenthal, 2011). Some argue that professors are ill-equipped to shift from conventional styles of teaching to new technology-rich forms (Becker et al., 2017; EDUCAUSE Learning Initiative, 2017). We argue that using the five principles of the teaching effectiveness framework (Friesen, 2009) to design blended learning environments along with collaboration technologies, instructors can provide students with opportunities to work in groups, collaborate with each other, and amplify their learning experiences. The five core principles of the teaching effectiveness framework include: (1) Teachers are designers of learning; (2) Teachers design worthwhile work; (3) Teachers design assessment to improve student learning and guide teaching; (4) Teachers foster a variety of interdependent relationships; and (5) Teachers improve their practice in the company of their peers. The Teaching Effectiveness Framework provides a lens for designing and assessing learning designs (Friesen, 2009).

We both design our courses in post-secondary education classes using these five guiding principles. The first principle suggests effective teaching practice begins with an intentional and iterative design cycle of learning. The second principle describes how learning experiences need to be authentic, relevant to a broad audience, and promote deep learning. The third principle specifies assessment practices are designed to inform next steps for students while the learning is taking place and guide next steps for the instructor in making pedagogical decisions along the way. The fourth principle indicates teachers need to foster a variety of interdependent relationships including human relationships and relationships with the disciplinary learning. Relationships include teacher-to-student, student-to-student, student-to-others outside of the class and school, and student-to-content. The fifth principle suggests teachers improve their practice in the company of peers. This principle calls on teachers to shift from working in isolation to working collaboratively to improve designs for blended learning.

Despite the perception that blended learning (also referred to as hybrid learning in the literature) is a combination of online and face-to-face instruction, definitions of blended learning are varied among authors. Allen, Seaman and Garrett (2007) suggest blended learning environments have between 30-79% of online content delivery combined with face-to-face instruction. In contrast, Moskal, Dziuban and Hartman (2013) argue there is no specific amount of time or ratio that defines blended learning; this type of learning should be interactive and provide active learning opportunities with online components. According to Picciano (2014) there is no clear taxonomy or agreed-upon definition of blended learning. In some cases, instructors use online spaces to complement classroom activities during class time or use online spaces for learning activities outside of class time.

For some time now, authors have predicted that face-to-face, on-campus courses would eventually include online components and perhaps the term blended would no longer be required (Garrison, 2017). Garrison and Vaughan (2008) defined blended learning as “the organic integration of thoughtfully selected and complementary face-to-face and online approaches and technologies” (p. 148). A decade later, we continue to use this definition and consider blended learning environments as face-to-face, on-campus courses that meaningfully integrate online components and promote participatory cultures. In this chapter, we maintain the term “blended” to emphasize how our designs for learning include an intentional combination of in-person and online experiences. In order to design blended learning experiences, we also draw on assumptions of participatory cultures as described by Jenkins and colleagues (2009):

- Expertise and teaching is distributed, so the most experienced can mentor new members in the community. Group knowledge building is a collective responsibility and endeavor (i.e. collective intelligence, pooling knowledge).
- Learners are socially connected with one another within and beyond the classroom. A culture of inquiry supports idea creation and the sharing of creations (i.e. networking).
- Learners are provided with multiple opportunities for engagement, expression and representation (i.e., multimodality, transmedia navigation).
- Collaboration and knowledge sharing is expected, learners believe their contributions matter, and embrace diversity of views and multiple perspectives (i.e., negotiation, discernment).

We argue that combining the teaching effectiveness framework with assumptions about participatory cultures can inform instructors designing blended learning, that is, technology-enhanced learning experiences in higher education to promote collaborative knowledge building (Bereiter & Scardamalia, 2014; Sawyer, 2012; Thomas & Brown, 2011). Thus, our classes can be considered blended learning that are technology enhanced learning environments, defined as “complex learning environments that enable appropriate use of technological resources in order to continually enhance the conditions conducive to learning” (Brown, 2013, p. 304).

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## DESIGNING WITH THE 5 PRINCIPLES OF THE TEACHING EFFECTIVENESS FRAMEWORK

In this section, we discuss each of the five core principles of the teaching effectiveness framework and how we design blended learning for our undergraduate students drawing on the qualities of participatory cultures and using collaborative technologies. It is important for readers to recognize the examples shared do not provide an exhaustive list of the ways collaborative technologies may be used within each of the five core principles but give an indication of many of the technologies we currently use in blended learning environments to support group work.

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### PRINCIPLE 1 – TEACHERS ARE DESIGNERS OF LEARNING

Our experience suggests that many students in higher education lack a clear understanding of how to work collaboratively in groups (Thomas & Brown, 2017) and this often results in the Pareto Principle where 20% of the students are doing 80% of the work (Sanders, 1987). In order to overcome this challenge, we recommend using collaborative technologies to design a low stakes group activity at the beginning of a semester in order for students to gain first-hand experience with Tuckman’s (1965) four stages of team development. These four stages consist of

Forming, Storming, Norming, and Performing. For example, students can use an online document to brainstorm ideas, share ideas with a group and then invite the group to help prioritize ideas. Dotstorming (dotstorming.com) is an example of an application that can be used for this type of low stakes group activity. The Team-Based Learning Collaborative (2017) also provides additional strategies and digital technologies for supporting this approach to team development.

#### DESIGN COMPLEMENTARY IN-CLASS AND ONLINE ACTIVITIES

For example, online discussion forums can be used to complement in-person discussions and engage undergraduate students in dialogue with each other and with the instructor to document and develop understanding over time. We start with developing a shared understanding of discussion norms, such as strategies for facilitating scholarly discussion and debate (Jacobsen, 2009). A structured reading group (SRG) approach can be used to integrate online and face-to-face discussions (Parrott & Cherry, 2011). For this activity, students are divided into groups of five to six. Each week there is a course reading and students are assigned a specific role and task to complete online (see Figure 1). Then during class time, one student is responsible for directing the discussion and another has the task of taking notes for the group's face-to-face discussion.

**Structured Reading Groups (SRG)**

Each week, you will come to class prepared to discuss the assigned readings. Prior to class, you will be assigned a particular role (described below), and you are responsible for completing your task before the start of class by posting your contribution to the online discussion board for that week. In class you will have approximately 20 minutes to discuss the reading and assignments within in your groups.

**Roles:**

- ❖ **Discussion Director:** Your job is to review the readings, come up with 2 to 3 questions for the group.
- ❖ **Passage Master:** Your job is to review the readings, and highlight ~2 critical passages.
- ❖ **Creative Connector:** As the name implies, the connector connects the readings to other ideas.
- ❖ **Devil's Advocate:** Acts as a critic. Develops a list of questions that challenge or poke holes in the main theories, ideas and examples presented in the readings.
- ❖ **Reporter:** Has a laptop and takes notes from the group's face-to-face discussion
- ❖ **Choice:** 6th person can choose between Devil's Advocate, Creative Connector, or Passage Master.

Figure 1. Structured reading group assignment to integrate online and face-to-face discussions. Screen capture taken by Norman Vaughan (2017).

This type of low stakes activity provides students with an opportunity to work together and create together as a group to develop understanding of a concept before engaging in group design work. Findings from Akyol and Garrison's (2008) study provided evidence of increased group cohesion when using an online discussion forum in comparison to other forms of dialogue, such as in-person conversations.

In participatory cultures, group knowledge building is a collective responsibility and endeavor (Jenkins et al., 2009). In other words, the online discussions and in-classroom discussions provide opportunities to foster collaborative communities of inquiry to pool knowledge, advance collaborative knowledge building and amplify collective intelligence. The role of the instructor is important through this process to help develop the online and in-class community (Garrison & Vaughan, 2008). For example, the instructor may select excerpts from the online posts and responses to share with students when meeting in-class. The instructor may provide small groups with several

anonymized excerpts from the online discussions and ask the group to use the assessment rubric to analyze the posts. Groups may discuss the excerpts and write one question that could be asked to deepen understanding or strengthen the quality of the post. The instructor may ask the groups to share all their questions generated from this exercise and reinforce the value in working together and engaging in collaborative knowledge building activities. Blending discussions occurring online and in the classroom, can help deepen student understanding and build a sense of social connection and community in the class.

## DISCUSS ETHICAL PRINCIPLES FOR USING MOBILE DEVICES AND OTHER LEARNING TECHNOLOGIES

Instructors may need to discuss ethical principles for using mobile devices in class if students are not accustomed to using technology for learning in the classroom and when working in groups. For instance, the instructor may model how to use VoiceThread to combine excerpts of visual, text and audio to demonstrate how to combine input from group members. Figure 2 shows the instructor modelling how to use VoiceThread when engaging students in a discussion about ethical principles for using mobile devices when working in groups. In participatory cultures, learners are provided with multiple opportunities for engagement, expression, and representation of their learning (Jenkins et al., 2009). As such, teachers are designers of learning and transmedia navigations. Using a tool, such as VoiceThread can provide learners with opportunities to interconnect multiple forms of expressions that contribute to group knowledge building.

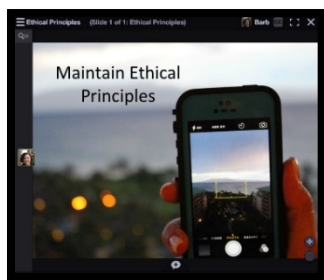


Figure 2. Using VoiceThread for expression and representation of learning. Screen capture and image taken by Barbara Brown (2017).

## PRINCIPLE 2 – TEACHERS DESIGN WORTHWHILE WORK

Authenticity is a key dimension when designing learning to ensure students are engaged in work worthy of their time and attention (i.e. problem-oriented, intended for a real audience and purpose). This type of work mirrors the

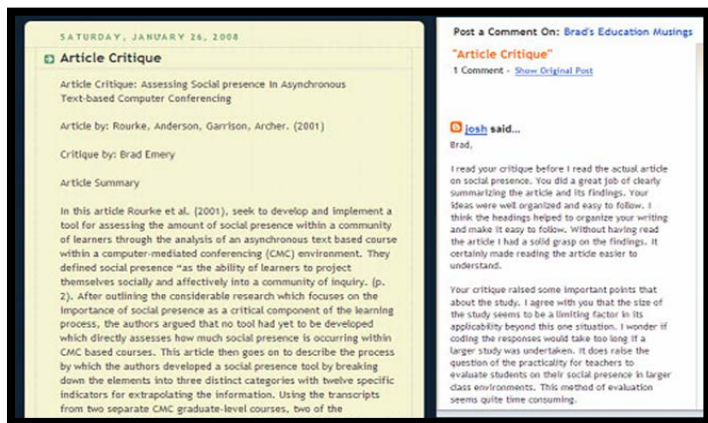


Figure 3. Article critique of peer reviewed journal article with author's response. Screen capture taken by Norman Vaughan (2008).

kinds of work an expert in the field would perform and fosters deep understanding. In participatory cultures, collaboration and knowledge sharing is expected; learners believe their contributions matter, and embrace diversity of views and multiple perspectives (Jenkins et al., 2009). For example, a group of students could use a blogging application such as WordPress to critique a peer reviewed journal article. The author(s) of this article can then post a response to the students' critique on the blog (see Figure 3).

#### ESTABLISH SHARED WORK SPACES TO SUPPORT COLLABORATION AND KNOWLEDGE SHARING

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In the classroom, seating can be arranged in small groupings to facilitate group discussions, sharing and collaborative design or students may have options to move to group work areas (see Figure 4).



*Figure 4.* Classroom group work taken by Norman Vaughan in Calgary, Alberta (2017).

In online spaces, students can meet in virtual or breakout rooms (Figure 5). Groups can determine which physical and online spaces to use for collaborating and designing together. We have found students regularly use online spaces to complement the work conducted when meeting with a group in-person. These online spaces assist groups when working together in physical proximity and also when making contributions or working apart from the group. The role of the instructor may include setting up the online work space, establishing goals for the group work sessions and arrange check points with each group. For instance, when using online rooms as shown in Figure 5, the instructor can ask the students to record their session or submit a copy of the note pod or chat pod following the group meeting.

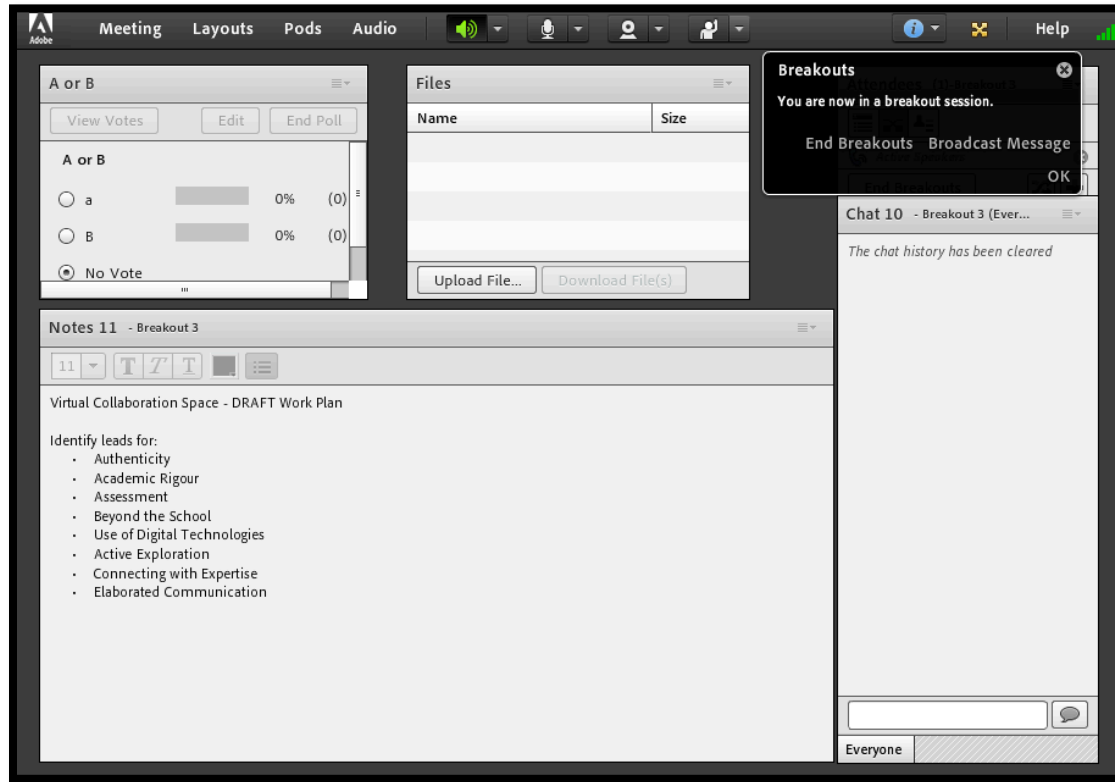


Figure 5. Group work using a virtual break out room in Adobe Connect. Screen capture taken by Barbara Brown (2017).

The Google suite of applications can also be used to engage students in productive collaboration around authentic work. For example, designing a unit plan is considered an authentic task for undergraduate education students, since this mirrors the work of practicing teachers in schools. Online work spaces can be used to support meaningful collaborative work. When undergraduate students in education work in groups to develop a unit plan, each student may take the lead on different aspects of the unit similar to what teachers in the field do when designing a unit together with their colleagues. Collaboration technologies, such as Google documents may be used to pitch ideas, form groups and develop work plans. Google Sheets may be used for project management and Google Sites can be used to develop unit components. Students can collaboratively draft their work in shared online spaces and also make the planning visible to other groups.

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### PRINCIPLE 3 – TEACHERS DESIGN ASSESSMENT TO IMPROVE STUDENT LEARNING AND GUIDE TEACHING

Assessment in business settings is often called 360-degree feedback, which involves self, peer, supervisor, and customer evaluations (Mamatoglu, 2008). We can replicate this approach in higher education by creating collaborative learning activities beyond group discussion forums that allow students to receive self, peer, teacher, and community feedback through the use of digital technologies. Collaboration technologies can help with documenting evidence of learning and assessing group work. A variety of assessment data can be visible online and gathered during the evolution of the project to monitor growth. Online environments can provide students with mechanisms to track evidence of growth and learning. This can be helpful for students when working in groups and reflecting on their individual and collective contributions and can inform instructors when assessing group work.

## USE TECHNOLOGIES TO PROVIDE COMPREHENSIVE EVIDENCE OF LEARNING

For example, students can use a blogging application, such as WordPress, to self-assess and reflect on their progress when completing a collaborative learning task. Students can document their learning and set goals for future growth and development with an ePortfolio (Figure.6).

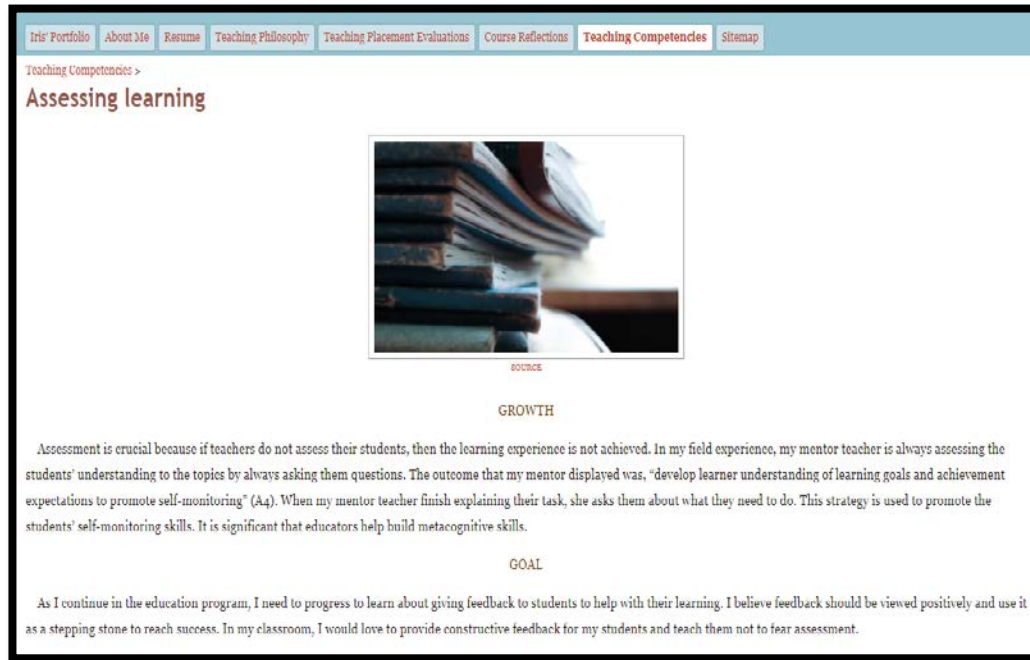


Figure 6. Example of an ePortfolio page used to document growth and goals for assessing student learning. Screen capture taken by Norman Vaughan (2017).

Instructors can use learning technologies to support self-assessment (William & Leahy, 2015). For example, students can use their mobile devices to capture their key learning moments during classroom conversations and include multimodal elements into their self-assessment. Thinking processes and feedback can be made visible while the work progresses in the classroom and outside of the classroom.

## MAKE INSTRUCTOR FEEDBACK VISIBLE IN SHARED ONLINE WORK SPACES

Online collaborative spaces can also be used for formative assessment (Earl, 2013; William & Leahy, 2015) strategies when students are in the classroom and outside of classroom time. Online spaces provide documentation and help students track and record iterative design processes and draft work. Figure 7 demonstrates how an instructor can provide feedback to students in an online space. The feedback can be reviewed by all students in the class and students can respond or resolve each individual comment.



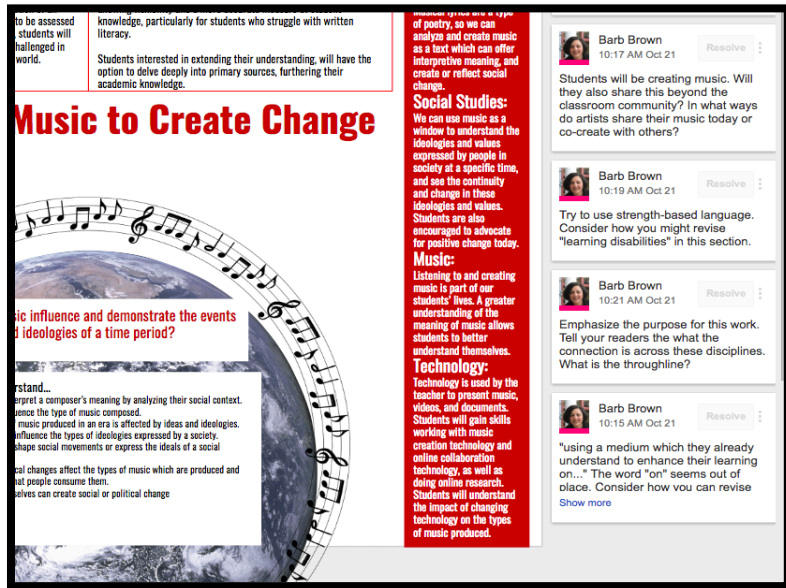


Figure 7. Instructor feedback using comments in Google Slides. Screen capture taken by Barbara Brown (2017).

## Peer groups can review work and provide feedback in online spaces

“Participatory culture shifts the focus of literacy from individual expression to community involvement” (Jenkins et al., 2009, p. 6). In terms of peer feedback on research papers, laboratory reports or developing collaborative unit plans, students can use the Calibrated Peer Review Tool from the University of California (2017). Figure 8 demonstrates a Google Document used for group work. Shared documents can easily be shared with others for gathering feedback.

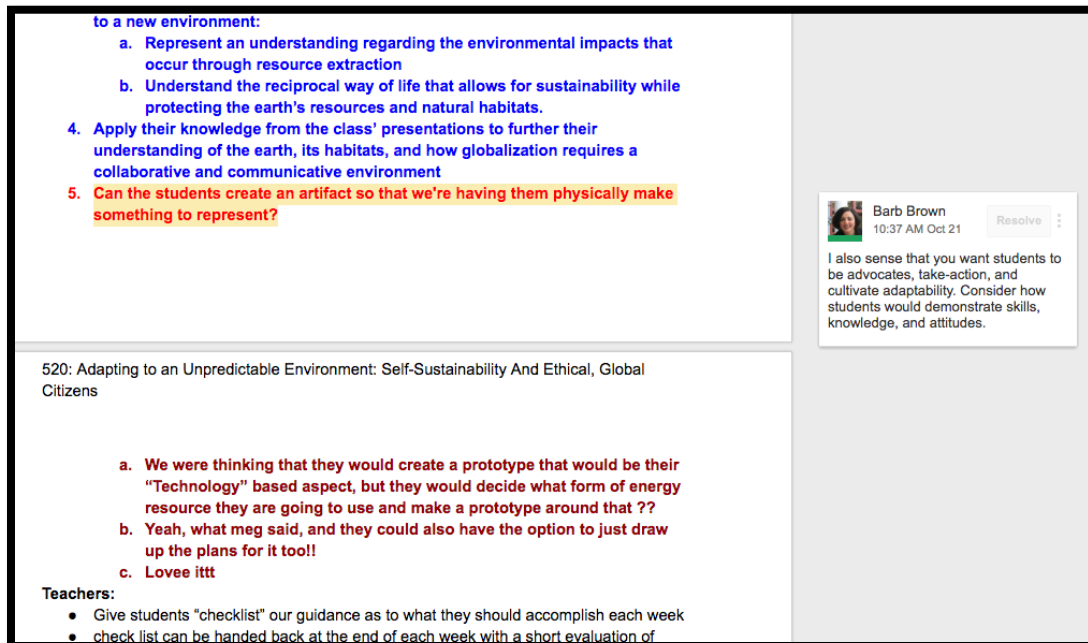


Figure 8. A shared online workspace that can be shared with others for feedback. Screen Capture taken by Barbara Brown (2018).

## ARRANGE FOR OUTSIDE EXPERTS TO PROVIDE FEEDBACK IN SHARED WORK SPACES

Experts in the field can be invited to online environments and provide students with feedback about their work. Experts seem to be more willing to offer students with feedback in online spaces. The flexibility in meeting online does not require travel to the university and time off from work. Instead, experts can join over their lunch break for a short time period and provide advice to students. Web conferencing software can be used to arrange synchronous feedback (i.e. 15-minute Adobe Connect or Skype sessions with an expert). In Figure 9, a classroom teacher provides undergraduate students with feedback about their unit plan during her lunch break using web conferencing software. In this case, the students shared their work with the expert and in turn, the expert provided immediate feedback to the group. Group members used the microphone and chat box to ask questions and seek further clarification from the outside expert.



Figure 9. Outside expert providing advice synchronously using Adobe Connect Web Conferencing taken by Barbara Brown (2018).

Friesen and Scott (2013) discuss the value in consulting with experts when students are engaged in exploring real-world problems during the inquiry process. Experts can be invited to interact with the online artifacts of learning and can then provide students with formative feedback and inform the development of criteria for high quality standards. For example, students can seek feedback from community experts by creating videos of their work and posting the results to online video sites such as YouTube. Community members can then watch these videos and provide feedback in the accompanying online discussion forum. TodaysMeet is an example of a tool that can be used to arrange synchronous or asynchronous textual feedback from outside experts. As shown in the transcript excerpt (Figure 10) from TodaysMeet, this is an online space that can be used to record ideas and engage in student-expert interactions.



Transcript:

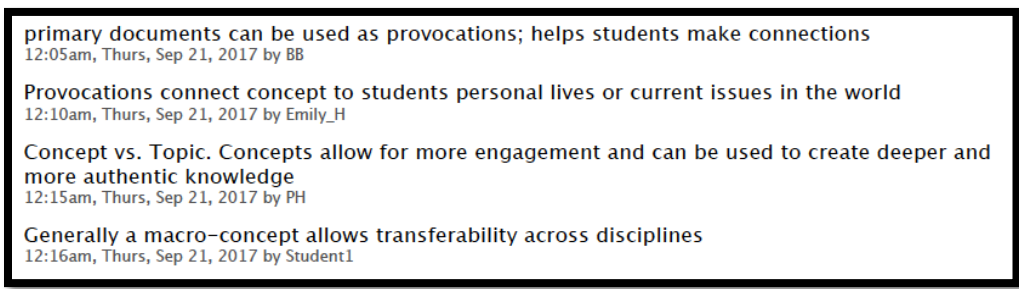


Figure 10. Today's Meet can be used for student-expert interactions. Screen capture taken by Barbara Brown (2017).

Formative feedback provided by the instructor, peers and outside experts can help guide students with their next steps and also inform the instructors' instructional design decisions. Collaborative technologies can be used to guide next steps for learning and for teaching.

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#### PRINCIPLE 4 – TEACHERS FOSTER A VARIETY OF INTERDEPENDENT RELATIONSHIPS

In the world of real estate, it is all about location, location, location whereas in education, the focus is on relationships, relationships, and relationships. Students are challenged when working in groups and need supports for working in collaboration and forming interdependent relationships (Thomas & Brown, 2017). The beauty of a blended learning environment is that students are able to initially find their voices by using asynchronous or synchronous communication technologies or a combination of both. Similar to our observations, other authors also recognize collaboration technologies are useful for supporting interdependent relationships and group work (Clark & Blissenden, 2013; O'Donnell & Hmelo-Silver, 2013).

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#### USE TECHNOLOGY TO SUPPORT COMMUNICATIONS

In participatory cultures, learners are socially connected with one another within and beyond the classroom (Jenkins et al., 2009). Communication can continue in blended learning environments using asynchronous and synchronous spaces. Students can draw on each other's strengths, negotiate ideas and work through their challenges as a group. The number of asynchronous technologies and synchronous technologies continues to grow, so we will not attempt to list them. The key is to take a strengths-based approach (Rath, 2007) to communication in a blended learning environment. Students may select collaborative technologies to communicate with their project group and manage their work. For example, students can use Google applications such as Docs and Hangout to support online group work. Students can collaboratively write in a Google Doc while synchronously chatting with each other in a Google Hangout (Figure 11).

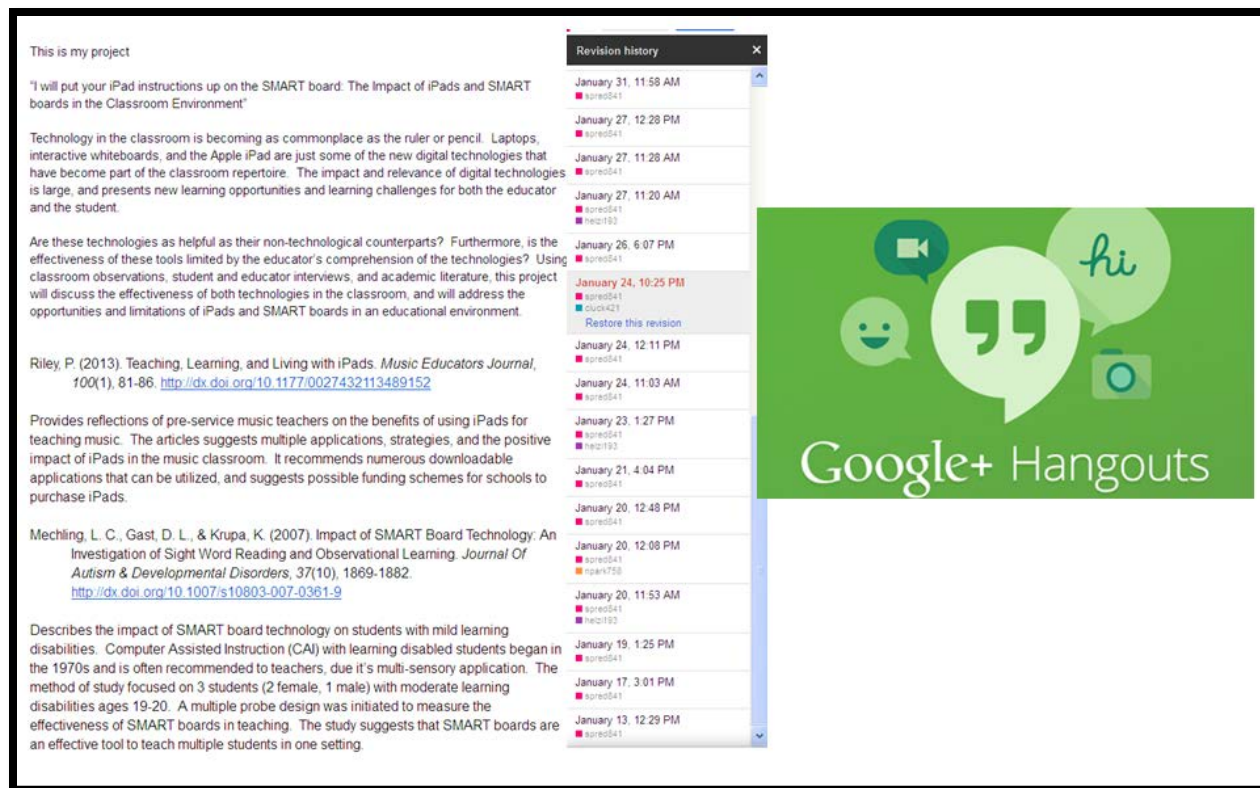


Figure 11. Students using both Google Docs and Hangout to support collaborative online group work. Screen capture taken by Norman Vaughan (2017).

The instructor may also select technologies to support group work. Figure 12 provides an example of text messages sent to students using the Remind app. The instructor can use this application to communicate with individuals, small groups or the whole class by broadcasting messages or other multimedia. Similarly, the students can send instant messages back to the instructor or use the emotion icons to provide a response.

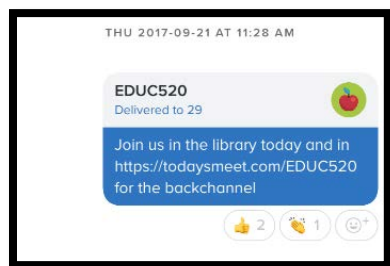


Figure 12. Broadcast messages using the Remind app. Screen capture taken by Barbara Brown (2017).

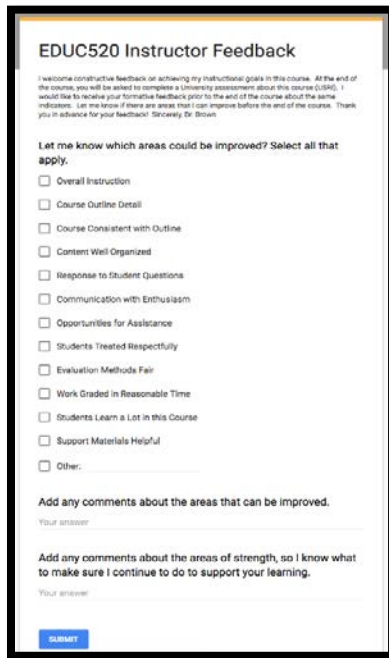
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## PRINCIPLE 5 – TEACHERS IMPROVE THEIR PRACTICE IN THE COMPANY OF THEIR PEERS

Instructors improve their practice by sharing their practice and artifacts of learning with their peers. One of the strategies we use to gather artifacts of learning is to seek input from our students. A variety of classroom assessment techniques have been developed that utilize digital technologies to effectively and efficiently support this process (Martin, 2012).

## SEEK STUDENT INPUT AND SHARE WITH COLLEAGUES TO IMPROVE PRACTICE TOGETHER

For instance, instructors can gather input, such as feedback about the learning design by using survey tools (i.e. online forms). Gathering input from students during the course (i.e., exit slips at the end of class, survey for mid-course feedback) can inform redesign and improvements when working alongside other instructors teaching the same course as part of a community of practice (Wiliam & Leahy, 2015). Figure 13 provides an example of a mid-course survey used to gather feedback from students. One of the ways the student input can be used is to share the results with colleagues and discuss opportunities for growth.



The image shows a screenshot of a survey form titled "EDUC520 Instructor Feedback". The form includes a welcome message, a list of checkboxes for areas for improvement, and two text input fields for comments. The checkboxes include: Overall Instruction, Course Outline Detail, Course Consistent with Outline, Content Well Organized, Response to Student Questions, Communication with Enthusiasm, Opportunities for Assistance, Students Treated Respectfully, Evaluation Methods Fair, Work Graded in Reasonable Time, Students Learn a Lot in this Course, Support Materials Helpful, and Other. The form also has a "SUMMARY" button at the bottom.

Figure 13. Example of Mid-Course Survey. Screen capture taken by Barbara Brown (2017).

In participatory cultures, group knowledge building is a collective responsibility and endeavor (Jenkins et al., 2009). A community of practice can work toward improving technology-enhanced learning environments and work together to develop and improve designs for learning. Figure 14 provides an example of Mentimeter, a tool used to gather input from students about the challenges with technology-enhanced learning. Colleagues may review this type of student input together and use the results to inform future redesign ideas.

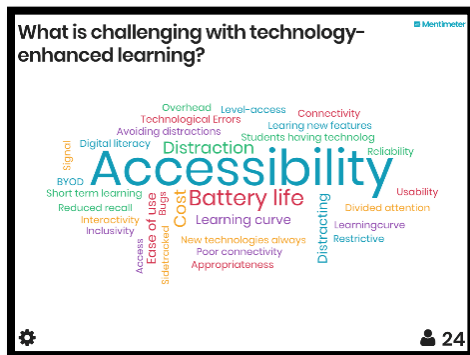


Figure 14. Mentimeter word cloud display of student responses. Screen capture taken by Barbara Brown (2017).

## ENGAGE IN A RESEARCH-PRACTICE PARTNERSHIP TO TAKE COLLECTIVE RESPONSIBILITY FOR QUALITY COURSE IMPROVEMENT

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Instructors may work on teams to engage in action research to improve practice (Brown, Dressler, Eaton & Jacobsen, 2015). In terms of developing an action research mindset and sharing evidence based practice with peers, the Alberta Initiative for School Improvement (AIS) (Parsons, 2011) was a model for facilitating this process and encouraging research-practice partnerships. The AIS framework provided support, resources, time, and recognition for teachers from across the Province of Alberta to collaboratively work together to meaningfully inquire into their teaching practice and share their results (Hargreaves et al., 2009).

In this chapter we provided examples of learning designs in blended learning environments using the five principles from the Teaching Effectiveness Framework (Friesen, 2009) and qualities of a participatory culture (Jenkins et al., 2009). The five principles from the Teaching Effectiveness Framework include: (1) Teachers are designers of learning, (2) Teachers design worthwhile work, (3) Teachers design assessment to improve student learning and guide teaching, (4) Teachers foster a variety of interdependent relationships, and (5) Teachers improve their practice in the company of their peers. In participatory cultures expertise and teaching is distributed and group knowledge building is a collective responsibility; learners are socially connected; learners are provided with multiple opportunities for engagement, expression and representation; and collaboration and knowledge sharing is expected. The examples discussed in this chapter can serve to inform instructors designing blended learning environments and higher education learners can benefit from learning experiences that meaningfully incorporate technologies to promote collaboration and group work:

- Design complementary in-class and online activities.
- Discuss ethical principles for using mobile devices and other learning technologies.
- Establish shared work spaces to support collaboration and knowledge sharing.
- Use technologies to provide comprehensive evidence of learning.
- Make instructor feedback visible in shared online work spaces.
- Peer groups can review and provide feedback in online spaces.
- Arrange for outside experts to provide feedback in shared work spaces.
- Use technology to support communications.
- Seek student input and share with colleagues to improve practice together.
- Engage in a research-practice partnership to take collective responsibility for quality course improvement.

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APPENDIX A: SAMPLE APPLICATIONS AND LINKS SUPPORTING GROUP WORK IN BLENDED LEARNING ENVIRONMENTS.

<b>Five Core Principles of the Teaching Effectiveness Framework</b>	<b>Sample Applications and Links</b>
1. Teachers are Designers of Learning <ul style="list-style-type: none"> <li>• Design is focused on building understanding</li> <li>• Design is informed by disciplinary knowledge</li> </ul>	<a href="#">Forming, Storming, Norming, and Performing: Guide to Developing an Effective Team</a> <a href="#">Team-Based Learning Collaborative</a> <a href="#">IDEO Design Thinking for Educators</a> <a href="#">Dotstorming</a> <a href="#">VoiceThread</a>
2. Teachers Design Worthwhile Work <ul style="list-style-type: none"> <li>• Work is authentic</li> <li>• Work fosters deep understanding</li> </ul>	<a href="#">Galileo Educational Network - Dimensions of Inquiry</a> <a href="#">Focus on Inquiry eBook</a> <a href="#">ADDIE Model</a>



<p>3. Teachers Design Assessment to Improve Students Learning and Guide Teaching</p> <ul style="list-style-type: none"> <li>• Assessment is comprehensive</li> <li>• Clear criteria is established</li> <li>• Students are self-directed</li> </ul>	<p><b>Self-Assessment Tools</b>          Blogging applications such as <a href="#">WordPress</a> and <a href="#">Blogger</a></p> <p><b>Peer Feedback Applications</b>  <a href="#">Calibrated Peer Review Tool from the UCLA</a></p> <p><b>Teacher assessment tools</b>          Professional learning plans (ePortfolios) such as <a href="#">Google Sites</a>, <a href="#">Wix</a>, and <a href="#">Weebly</a></p> <p><b>Tools for community expert feedback</b>  <a href="#">YouTube</a> - videos and online discussions  <a href="#">TodaysMeet</a> – engage in student-expert conversations</p>
<p>4. Teachers Foster a Variety of Interdependent Relationships</p> <ul style="list-style-type: none"> <li>• Students’ relationship to the work</li> <li>• Teachers’ relationship to the work</li> <li>• Students’ relationship with each other</li> <li>• Students’ relationship to their local communities</li> </ul>	<p><b>Asynchronous collaborative technologies</b>  <a href="#">Voicethread</a>  <a href="#">Instagram</a>  <a href="#">Twitter</a>  <a href="#">Snapchat</a>  <a href="#">Facebook</a>  <a href="#">Pinterest</a>  <a href="#">RemindApp</a>  <a href="#">Brightspace Learning Environment</a></p> <p><b>Synchronous collaborative technologies</b>  <a href="#">Skype</a>  <a href="#">Facetime</a>  <a href="#">Facebook Messenger</a>  <a href="#">Zoom</a>  <a href="#">Remind</a>  <a href="#">Adobe Connect</a></p>
<p>5. Teachers Improve their Practice in the Company of their Peers</p> <ul style="list-style-type: none"> <li>• Teaching is a scholarship</li> </ul>	<p><a href="#">Classroom Assessment Techniques (CATs)</a>  <a href="#">Classroom assessment techniques designed for technology</a>  <a href="#">Google Forms</a>  <a href="#">Free Assessment Summary Tool (FAST)</a>  <a href="#">Mentimeter</a></p>

CHAPTER  
9

# FINDING THE BALANCE: POTENTIAL AND LIMITS OF THE HYBRID-BLENDED FORMAT

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## INTRODUCTION

In this chapter, I summarize a representative sample of research on the strengths and limitations of the hybrid (or “blended”) course format. I focus on what is known about the effectiveness of this format for student learning and faculty and student perceptions of the format. In my conclusion, I provide what I hope are useful takeaways for those considering adopting this format.

While there is a body of research literature on the hybrid course format, its quality varies significantly. For example, Zhao and Breslow (2013) found only about 25 studies extending from the late 1990s met a rigorous research standard. Bernard, Borokhovski, Schmid, Tamim, and Abrami (2014) proposed a set of steps researchers can take to perform better meta-analyses of the literature in hopes of improving the state of understanding about the effectiveness of hybrid courses. The situation may in part be due to the novelty of the format; Drysdale, Graham, Spring, and Halverson (2013) noted that it is an active area of research in recent education-focused dissertations.

What is meant by a “hybrid” or “blended” course? Attempts to define the term makes up a sub-genre in education research (e.g., Zhao & Breslow, 2013; Vignare et al., 2005; Doorn & Doorn, 2014). Common definitions include viewing hybrid courses as the inclusion of online or web-based technology, a mix of pedagogical styles, a reduction of face-to-face instruction (usually lectures), or a mix of instruction with real-world job tasks (Bernard et al., 2014). Margulieux, Bujak, McCracken, and Majerich (2014) developed a complex taxonomy along two dimensions to address the differences between types of hybrid courses. Complicating matters, the term hybrid can be used to describe specific activities, courses, entire programs, or institutions (Graham, 2006). For this chapter, the term hybrid or blended will always indicate instruction at the level of a course.

Typically, hybrid courses seem to involve mixed modes of instructional delivery, with some face-to-face or traditional time that is enhanced with nontraditional activities to meet the learning objectives of the course. Graham (2006) stated that the three major forms of hybrid formats are combinations of modes of instruction, combinations of instructional methods, or a combination of online and face-to-face instruction. These nontraditional activities are typically technologically-based (online, via the Web) but can involve a variety of activities or assignments in different modes (McGee & Reis, 2012). The nontraditional portion of the course can involve activities that involve other forms of learning processes, developing a product or proposal, or working on a project. These activities can include learning diaries that students keep of their learning (Nückles, Schwonke, Berthold, & Renkl, 2004), group work, videos, or a variety of options to in-class time. The time ratio between online and face-to-face activities are disparate from one instance to another and the optimal ratio is not clear. Courses deemed “hybrid” could run from 87% face-to-face down to 25% (Ranganathan, Negash, & Wilcox, 2007). Most authors tend to recommend 50% in-class and 50% online, but that appears to be more of a heuristic for scheduling courses on a block system than an empirically established optimal ratio.

Despite some confusion over precisely what hybrid courses involve, the approach has reached the milestone of having a well-known handbook dedicated to it (Bonk & Graham, 2012). Many authors seem to prefer the term “blended” (as in, blended learning) over “hybrid” as a way to make clear the goal is to create one larger learning experience that is comprised of some disparate activities and instructional methods, not just two mini-courses titled as one experience in parallel. The aim with “blended” courses is for something more symbiotic between the in-class and out-of-class activities to reach the learning objectives. Whether a course is called hybrid or blended, what are the perceived advantages of the format? According to Graham (2006), instructors pick the hybrid format to (1) alter their pedagogical approach, (2) provide increased flexibility to students, and (3) increase cost effectiveness by distributing some of the learning activities outside of the classroom, reducing the reliance on existing facilities.

Instructors may believe that moving away from direct instruction via lectures may improve their pedagogical approach. For example, Kenney and Newcombe (2011) attempted a hybrid course in the hope of creating a more active learning experience for a large lecture course. Others hope to produce higher grades and improve learning (Babb, Stewart, & Johnson, 2010; McKenzie et al., 2013). A greater sense of community can be fostered, at a level that students report as higher than in fully online courses (Dziuban, Moskal, & Hartman, 2005).

At the same time, more time flexibility is provided to the students. Increased flexibility for students is particularly important if an instructor is hoping to provide increased access to nontraditional students who may already be working or have other obligations (Graham, 2006). Some authors see the combination of face-to-face instruction with online activities as providing the flexibility afforded by an online format with the personal connections from a traditional setting (Lampert & Hill, 2012), and giving students more chances to participate (Rovai & Jordan, 2004). Some authors believe that a hybrid format can ameliorate the known dropout problem that fully 100% online courses have (Brunner, 2006; Doorn & Doorn, 2014). It is possible that hybrid courses facilitate student performance, acting as a bridge to the more autonomous online format.

In sum, hybrid/blended courses have provided interesting opportunities for faculty and students because of their ability to provide new instructional methods to meet existing learning objectives, to provide students with more flexibility, and to make offering courses more affordable. In the next section, I review what has been established about the effectiveness of hybrid courses on learning.

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## HYBRID/BLENDED COURSES & STUDENT LEARNING

Some recent studies have found empirical evidence for improved student performance in hybrid/blended courses over face-to-face formats. McFarlin (2008) found an improvement of 9.9%, one letter grade, for students in a hybrid format of a class over the traditional format. McFarlin believed this was the result of the students’ ability to access course content through a learning management system (WebCT, in this instance). McFarlin’s study employed test bank items that were the same in both conditions, but the testing environment itself is not detailed. What is not always made clear in hybrid-course research reports is whether the assessments being used to compare the conditions are kept standardized across formats. In itself, this does not indicate whether the hybrid benefit is an illusion or not: Online tests can have additional challenges above pencil-paper tests, including random selection and an inability to return to prior items. Without a standardized format of assessment, parceling out the causal factors of a performance benefit with hybrid-course learning is not possible. Another study found that students in a hybrid course were more likely to use online resources (Blackboard in this instance) and performed better (DeNeui & Dodge, 2006), implying that better use of the online resources encouraged better learning. In a small study, Akyol and

Garrison (2011) found evidence for deep conceptual learning by students in a hybrid class using a mix of qualitative and quantitative measures.

Some studies found that the move to a hybrid format from face-to-face format provides similar learning outcomes with reduced face-to-face contact time with the instructor (Baepler, Walker, & Driessen, 2014; Ashby, Sadera, & McNary, 2011; Bowen, Chingos, Lack, & Nygren, 2014). Baepler et al. (2014) found similar results for hybrid courses with a reduction of two-thirds face time with an instructor, although many elements changed between conditions, precisely what caused the change in performance is unclear. Ashby et al. (2011) described a standardized assessment comparison of traditional, hybrid, and online formats and found better retention for hybrid and online formats; students in the hybrid option performed worse than the other two.

Not every comparison finds hybrid formats improve or maintain student learning. Olitsky and Cosgrove (2014) found the differences in student performance in either an online or hybrid economics course disappeared once the students' academic background and ability was taken into account. In one study, the traditional face-to-face class did better on a final exam by 5%. As reported, the format for the exam may have varied by condition; the face-to-face, hybrid, and online students were given different directions about the exam, with hybrid students specifically admonished not to work with others. In a comparison of introductory teacher education courses, final course grades were higher for an entirely online section than either hybrid or traditional formats (Reasons, Valadares, & Slavkin, 2005). As noted earlier, much of the course content was made available online in one or more sections, diluting the ability to make causal statements about the relative effectiveness of the formats. The exams involved the same items, but the conditions of testing are not reported clearly. That online, un-proctored testing could produce scores that are higher than tests provided in-class could be due to reasons other than the instructional format.

To recap, not everyone has been able to demonstrate that hybrid/blended formats improve student learning, and empirical comparisons between hybrid/blended learning and online learning are mixed. One early literature review that compared online with hybrid courses found the majority of the selected studies did not find a difference in student learning between the two formats, and the remainder provided mixed results (Means, Toyama, Murphy, Bakia, & Jones, 2009). A major challenge for comparative research in this area is the variety of conditions and features that are present in different formats. Many features, such as online videos or discussion boards, are provided in both hybrid and online courses within studies, making a comparison of benefits difficult.

Given the mixed results of individual studies, meta-analyses are helpful. Lampert and Hill (2012) noted that studies vary tremendously in terms of the time spent online, content area, and student population, so generalizing from these results could be difficult. In a meta-analysis of 45 studies, Means, Toyama, Murphy, and Baki (2013) reported that online learning (whether fully or partially online) produced modestly better student performance than traditional instruction, with a mean effect size of +0.20. Comparing formats, blended learning provided a mean student performance effect of +0.35 opposed to an online mean improvement effect of +0.05. According to Lipsey and Wilson (1993), most effect sizes in the social sciences are between -.08 and 1.08, so this small effect size is meaningful (an effect size of +0.20 may be enough to be worth considering in educational policy research). This mean effect size means 64% of the students in a hybrid course performed above what they would have performed in a traditional course, an improvement of 14% above chance. Of course, the usual caveats about meta-analyses apply: Usually research published about interventions tend to be those that show positive support for the intervention, although Means et al. (2013) tried to address the potential for a publishing bias statistically.

Given the evidence that hybrid/blended formats can modestly improve student learning, what are the causal factors for that improvement? Several possibilities have been proposed (Graham, 2013). First, students in hybrid/blended courses may accept the online homework more readily than in the traditional courses. Evidence for this possibility is the higher completion rates of online work of students in a hybrid format than the attendance at lectures for students in a traditional course (Riffell & Sibley, 2004). Access, use, and re-use of online formative assessments has been found to improve scores on summative assessments (McKenzie et al., 2013). Second, collaborative learning activities may be more effective for online work than online active learning activities. From the Means et al. (2013) meta-analysis, collaborative instruction produced a mean effect size of +.25 relative to independent online activities (+0.05) on student performance. Expository instruction produced a mean effect size of +0.39.

Third, many authors believe that the “blended” part of hybrid course formats may be the important distinction in determining when hybrid courses will perform well (McGee & Reis, 2012). The instructional goals and the alignment of the in-class and online activities may matter more than the format itself. Coincidentally, the comparison between hybrid course performance and traditional course performance is nearly always based on exam scores or final grades in the literature, not how well students meet a set of predefined learning objectives.

Finally, the differences between the formats may not be entirely the result of the format itself. A particular challenge with comparing formats that are this diverse (across institutions, content areas, program and course objectives, student populations, and instructor) is that a combination of features may be what works in one situation or another (Means et al., 2013). When courses use blended learning, they tend to encourage more study time, provide more resources, and explicitly involve activities that require interaction between students.

So how does one empirically answer the question, “are hybrid courses better than online or traditional formats for student learning?” Perhaps this is a paradox within the question: To the extent that studies deploy different activities across different formats, results of differences by format can be attributed simply to the differences in activities. If different formats employ similar activities (e.g., online video clips, handouts available in each format), then the benefits of one format over another will become muted. Not all benefits of hybrid courses can be said to be solely a benefit of the hybrid approach (Brunner, 2006). It is worth noting that the typical assessment of student learning in comparison studies are multiple choice exams, not a comprehensive assessment of how well students are meeting pre-defined learning objectives. Reliance on a recognition-based memory test for validation may not be a sufficient measure for what hybrid/blended learning proponents claim are the strengths of the hybrid approach. Additionally, student characteristics may play a role too: The needs of students may vary depending on factors such as rank and employment. Students might benefit from starting in traditional face-to-face courses in college before attempting hybrid or online classes (Doorn & Doorn, 2014), particularly since there appears to be a greater need for self-regulation in those formats (Lynch & Dembo, 2004).

In sum, individual studies find that hybrid/blended learning may or may not provide a benefit for student learning. Meta-analyses indicate that there is at least some benefit, but it is not clear why. In the next section, I examine student perceptions of hybrid courses.

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## STUDENT PERCEPTIONS OF HYBRID/BLENDED LEARNING

Hybrid/blended learning may improve student learning in some situations, and does not appear to weaken it. What is the level of “learner satisfaction” (Graham, 2013) with hybrid courses? Fortunately, many more studies report on the results of surveys of students in hybrid courses than conduct comparisons of effectiveness. Overall, research on

student attitudes on hybrid/blended learning are positive (Buzetto-More & Sweat-Guy, 2006; Marques, Woodbury, Hsu, & Charitos, 1998; Yudko, Hirokawa, & Chi, 2008; Salamonson & Lantz, 2005) although Millennials reported being less excited than other age groups on one survey (Dziuban, Moskal, & Hartman, 2005). Using qualitative and quantitative measures, Leh (2002) found students in hybrid courses to be generally supportive of them. Having said that, some have found that hybrid courses can suffer from the same problems as online courses and may exhibit as many newly created problems as those they are trying to resolve by moving away from traditional formats (Jackson & Helms, 2008), such as issues of communication and a greater reliance on technology. Students who report being the most computer literate have been found to prefer hybrid formats the most (Yudko et al., 2008).

Students in hybrid courses are concerned about the quality of the communication between students and faculty (Babb et al., 2010), but most studies concluded that students liked the level of communication they experience in a hybrid format (Mansour & Mupinga, 2007; Riffell & Sibley, 2005), including video feedback (Borup, West, Thomas, & Graham, 2014). Students also reported talking to other students more frequently in hybrid courses (43%) than traditional courses (29%), assuming a particular student communicated with another student at all (Riffell & Sibley, 2005).

Hybrid courses require students to rely more on the instructional resources provided to them. Eighty percent of students in a hybrid course reported using their textbooks once or twice a week, which was twice as often as students in a traditional course (Riffell & Sibley, 2005). This may or may not be what students want: In one study, higher performing students expressed a preference for a traditional format (Salamonson & Lantz, 2005). Hybrid courses do not appear to naturally improve student interest in the subject matter (Bowen et al., 2014).

Of course, perceptions about hybrid/blended courses may vary greatly by the nature of the students and their perceived needs. Hybrid courses should provide more flexibility over traditional courses, in order that they can meet a greater number of student needs (Poon, 2013) especially for non-traditional college students (Lampton & Hill, 2012) and precollege students (Means et al., 2013). In fact, most students who use a learning management system (e.g. Blackboard, WebCT) come to like it over time (Pan, Gunter, Sivo, & Cornell, 2005), and students appreciate the flexibility (Vaughan, 2007). However, students can report struggling with time management and understanding technology at the beginning of the course (Vaughan, 2007). While students report being familiar with the Internet in general, they are not necessarily well-versed in specific technologies, such as RSS feeds, online library databases, and file transfer technologies such as FTP and Gopher (Marques, Woodbury, Hsu, & Charitos, 1998).

Studies have found that students who are conscientious and usually get high grades are more likely to do well in a hybrid course (Nakayama, Yamamoto, & Santiago, 2007). Another study found upperclassmen performed better than freshmen (Riffell & Sibley, 2005), which could be a problem for underprepared students or those who are new to college. However, a meta-analysis of hybrid and online courses did not find differences in student populations to be a significant moderator of learning effectiveness (Means et al., 2013). This finding might oversimplify many factors, including which instructors chose to create a hybrid course, the lack of random selection of students who elect to take a hybrid course, or the lack of random assignment of which courses are modified for hybrid formats.

In sum, there is at least some concern that the needs of the student population have to be taken into account with hybrid courses. Logically this should not be as important an issue one might expect with fully online courses, but some attention needs to be paid to the readiness of students to handle more of their own learning than in a traditional format. What other aspects of the hybrid format should be considered when evaluating the format?

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## OTHER ASPECTS OF HYBRID/BLENDED LEARNING

According to Graham (2013), what makes hybrid courses unique beyond student learning and satisfaction are faculty satisfaction, access and flexibility, and cost effectiveness. First, faculty find themselves satisfied with hybrid/blended courses (Dziuban, Moskal, & Hartman, 2005; Lindsay, 2004; Marques, Woodbury, Hsu, & Charitos, 1998). Most reported that student learning is improved in hybrid formats, or that there is little difference compared to face-to-face formats (Dziuban, Moskal, & Hartman, 2005). Some authors warn that the instructor needs to have a heightened focus on open communication due to the mixed nature of the course (Heinze & Procter, 2004; McGee & Reis, 2012), and that instructors may need to be open to continuous interaction. Miscommunication in hybrid courses can encourage lower engagement and completion, and lower course evaluations (McGee & Reis, 2012).

Second, compared to a face-to-face format, hybrid courses certainly appear to offer more access and flexibility, leading some to find that they can reduce seat time in lectures by two-thirds and encourage more active learning (Baepler et al., 2014). Of course, this may hide a contradiction: If a hybrid course requires more interactivity and group activities, is it really more flexible and adaptive (McGee & Reis, 2012)? It is possible that the requirement to physically meet--at all--will still not provide the amount of flexibility that nontraditional students require, and departments could offer courses in both online and hybrid formats, undermining the hybrid format (Mandernach, Mason, Forrest, & Hackathorn, 2012).

Finally, the cost effectiveness of hybrid and online formats have been widely touted in the media (Lewin, 2013). However, it is not entirely clear that a cost-benefit analysis would show this to be the case. Online and hybrid formats require some form of learning management system (most of which are not free), Internet access on campus for faculty and off campus for students, productivity software, supplemental online resource access via library subscriptions or video editing facilities and support, and the cost of computer equipment on and off campus. The institution may cut costs by moving online, but some of the cost is likely to be borne by students.

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## CONCLUSIONS

Taken together, the hybrid/blended format appears to be a promising option for faculty who are looking to mix up their teaching or incorporate some new pedagogical options to their traditional face-to-face teaching. The current state of research indicates that hybrid courses can improve student learning, may address retention better than fully online courses, and are received positively by students and faculty alike, with some exceptions. Below, I offer some literature that offers guidelines for creating a hybrid course, and end with some conclusions of my own based on what I observed in my own courses and how hybrid courses may connect to modern theories of learning and memory.

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## RESOURCES FOR INSTRUCTORS

Hensley (2005) presented a case study of the steps taken to create a hybrid course; Porter, Graham, Spring, & Welch (2014) provided an example of institutional adoption of the hybrid course format. Babb et al. (2010) provided some thoughtful insights into how to handle the distance component of a hybrid course. Most of these involve providing clear communication about assignments, designing activities that require participation, creating and holding firm to deadlines, and providing feedback on assignments. Of course, the recent handbook of blended learning will also be useful (Bonk & Graham, 2012; Graham, 2006; Graham, 2013).

Among the challenges facing instructors choosing to experiment with a hybrid format is that much of what is in the literature is anecdotal experience or normative practice, rather than based on experimental results (Means et al., 2013). In many cases, best practices may be in conflict with the pedagogical beliefs of the instructor, which may be the reason hybrid course design can vary so much (McGee & Reis, 2012). Instructors need to try to avoid the “course and a half syndrome” (creating too much work for one class) to make sure the connection between the traditional and non-traditional portions of the course is apparent (Brunner, 2006).

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## CONCLUDING REMARKS

It is not clear in much of the published research on hybrid/blended course effectiveness that the dependent variables in testing and assessment are held constant across conditions. The information is usually underspecified, and not explicitly tied to the learning objectives of the course. When some researchers compare traditional, hybrid, and online courses, they intentionally include every format element in each condition, so the testing environment is intentionally varied. In some cases, the assessments used appear to be similar, but the details are very vague (whether students were allowed to pick the location and place of exams across sections, whether notes and books were allowed, or if the exams were timed and proctored are typically unstated). It is not necessarily true that open book tests are easier than closed book exams; however, I wonder about the nature of the contextual cues that are learned when students are required to study from their resources in hand at home at their convenience and are then assessed in the same fashion, compared to students in a traditional format who have been encouraged to listen and record from oral presentations, read later, and then take a test in a less comfortable environment than their own home. Encoding specificity theory (Tulving & Thomson, 1973) would expect there to be a difference between the retrieval cues created at learning between those conditions; students taking the test at home after studying at home should incur a natural cue retrieval advantage. Finally, was collusion with other students possible in some formats and not others? One article acknowledges the issue by reporting on the use of an honor code to reduce self-reported cheating in an online section (LoSchiavo & Shatz, 2011).

Ultimately, the issue may be an unresolvable. The confounding variables are impossible to avoid when comparing online, hybrid, and traditional course formats. If the content is provided equally across sections (such as interactive web activities, online videos), then the benefits from each format may be largely neutralized. If different content or activities are provided, then differences in performance can be attributed to those activities rather than the format.

The success of a particular pedagogical approach may rely on the interaction of a particular instructor with a particular student population and a specific set of learning objectives. This is a common obstacle in educational research: Teaching is as much art as science, and trying to divine the precise causal role of any one element is extremely difficult in the mix of interacting variables. I experience this when I incorporate a new activity in my courses: Initially, my enthusiasm and the newness of the activity seems to drive both student interest and thus performance; after several semesters, my enthusiasm wanes, as does student interest and performance. Selecting an activity that I am excited to share with students may be as important as the performance benefit from the activity. Additionally, the context may be important in a postsecondary environment; it seems bizarre to suggest that there is one pedagogical format that is so content-neutral that it will always perform better regardless of content or learning objectives. The interaction among many factors is probably what matters.

An educator wanting to try a hybrid format can move ahead without fear. There is no persuasive evidence at this time that hybrid/blended learning is harmful to student learning, so an instructor can cite existing research to support the attempt to administration. It may not be all that different from what some faculty already do. In higher



education, the level of instructor autonomy leaves a lot of room for different approaches and styles even with predefined learning outcomes. What some instructors do in their traditional classrooms would look a lot like hybrid courses; some faculty hold part of their courses in a computer lab once a week to accomplish online tasks, or will hold occasional off-campus activities yet the courses are scheduled and billed as traditional courses. Active learning activities can be included in many face-to-face courses.

Ultimately, the learning that occurs from a course needs to meet at least two broad objectives: The development of a meaningful understanding of the fundamentals of the material, and an ability to transfer that knowledge to appropriate, novel situations for problem-solving. Long-term memory for knowledge appears to be meaning-based ( Craik & Lockhart, 1972; Rudmann, 2017), so a pressing question for a hybrid course instructor is, how well does the time spent in class and outside of class develop meaningfully comprehension and retention of the material? Additionally, the contextual cues we develop at the point of learning are important for retrieval. What are the situations that the students will need to retrieve the pertinent information, whether later in the same course, in other courses, or in real-world situations? Will they need to use the information to identify critical concepts in research articles, or to apply the knowledge in team-based project situations? Awareness of how the students will be expected to transfer the knowledge one day can guide the instructor in deciding which forms of study and retention can be appropriately handled in the class, and which should be migrated to an authentic, real-world activity that may or may not be developed during formal in-class time.

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CHAPTER  
10

# INCORPORATING ASYNCHRONOUS ONLINE DISCUSSIONS IN BLENDED AND ONLINE EDUCATION: TOOLS, BENEFITS, CHALLENGES, AND BEST PRACTICES

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## INTRODUCTION

An important instructional strategy employed in most online and blended education courses in institutions of higher education (IHE) is asynchronous online discussions (AODs), which are sometimes referred to as asynchronous online conferences, forums, or threaded discussions. Asynchronous online discussions (AOD), a form of computer-mediated communication (CMC), are a popular and effective strategy for engaging students (Swan, 2002). They provide students with the opportunity to learn the course content from and with their peers and instructor(s).

Because significant student-student and student-instructor interaction in online courses occurs in AODs, and certainly also in blended education, it is imperative for educators, students, and other stakeholders involved in online and blended education to comprehend the implications of their use. It is through AOD that interaction most often occurs in asynchronous online courses. In blended courses, clearly students and instructors meet part of the time in person, but they can also use AOD to expand students' learning beyond their face-to-face (F2F) meetings. Interaction, "commonly understood as actions among individuals" (Abrami et al., 2011, p. 86), is an important characteristic of online education because students learn through student-student, student-instructor, and student-content interaction (Abrami et al., 2011; Bernard et al., 2009; Moore, 1989). Bernard et al. (2009) found that interaction positively affects student learning. However, they cautioned that instructors should not focus on increasing the quantity of interactions, but rather on increasing the quality of interactions. This is precisely why it is important to understand how AOD are utilized in online and blended education, as well as the benefits, challenges, and best practices for their success. This chapter introduces some of the most popular technology tools for hosting AODs, as well as several benefits, challenges, and best practices for incorporating AOD in IHE.

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## AOD TECHNOLOGY

Various technology tools can be used for hosting AODs. Some were specifically designed for fostering interaction and engagement in online and blended education courses, whereas others were designed for other uses, for instance, messaging between work teams (e.g., slack: <https://slack.com/>). Tools that can be used for AOD range from stand-alone technology tools such as Backchannel chat (<http://backchannelchat.com/>) or Piazza (<https://piazza.com/>), or tools integrated within learning management systems (LMS) such as Blackboard, Canvas, Coursera, or Moodle. Most LMS allow for posting of various media formats (e.g., video, audio, photos).

Alternatively, instructors might use tools that take advantage of the multimedia capabilities built into the tool, such as Flipgrid (<https://info.flipgrid.com/>), Vialogues (<https://vialogues.com/>), or VoiceThread (<https://voicethread.com/products/highered/>). Both Flipgrid and Vialogues are stand-alone, video-based discussion tools. Flipgrid allows users to create short 15-90 second video responses for the free version and longer 15 seconds to 5 minutes videos for the paid version. Vialogues functions more like a video annotation tool allowing users to post text-based responses visible alongside the video question or prompt. A useful feature is the ability to timestamp a text-based response so that users can go directly to the point in the video that the text-based response refers. On the other hand, VoiceThread provides a forum for users to respond to a variety of media (e.g., a video recording, graphic, slideshow) by responding via text, telephone, microphone, webcam, or a file upload. Although each tool is different, each promotes the use of media such as video for responding to or commenting on some type of prompt. Flipgrid and Voicethread offer free trial versions and Vialogues is available for free to anyone who opens an account.

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#### WHAT ARE THE BENEFITS OF AOD?

There are many benefits to using AOD in online and blended education for both students and instructors. Not only do they generally foster development of a shared learning community where students and the instructor learn from and with one another, but they also cultivate the learning of content through reflection, debate, questioning, and summaries (deNoyelles, Zydney, & Chen, 2014; Kayler & Weller, 2007; Swan, 2002). Additionally, because they are asynchronous, students and instructors can participate when most convenient for them. As such, students' access to learning expands beyond the local community.

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#### STUDENT BENEFITS

AOD provide students the opportunity to post questions for clarification, answer questions that help them solidify their own learning, as well as foster their peers' learning. Instead of being put on-the-spot to answer a question in front of an entire class, students would have the time and intellectual space to study the content, reflect on the questions/prompts, and craft a thoughtful response. This can be especially beneficial to students who might need more time such as shy, nonnative speakers, and/or those with exceptional learning needs. Such students' participation levels may even be greater than compared to their F2F course participation because the pressure to answer questions immediately after being asked no longer serves as an impediment to their participation. Other advantages involve learning about others' different perspectives, as well as through multimedia, and the flexibility to participate when most convenient for them without having to commute to an IHE. For students who live in different time zones and countries, this can expand the accessibility to learning anytime, anywhere! Although not unique to online and blended learning, this flexibility is an important benefit to most students.

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#### INSTRUCTOR BENEFITS

AOD offer several advantages to instructors who use them. For instance, online and blended education instructors have the opportunity to interact with their online and blended education students with depth and breadth outside of brick-and-mortar classrooms. They can read, review, and reflect on their students' posts, including information they share about themselves. In a F2F course, for example, the instructor may not have the opportunity to engage as much with her/his students because of the bounded class meeting time (e.g., a F2F course may only meet once, twice, or three times a week), number of groups, and/or quantity of students. On the other hand, in an online or blended education course, instructors have access to all of their students' postings, in addition to a history of their postings consisting of their questions, comments, and responses to their peers. This provides a "window" into

students' thinking, as well as paints a picture of the amount of effort they seem to be dedicating to their studies. It also offers instructors information about who their students are as learners and individuals. Rather than only having a few hours to engage with a whole class of students F2F, in online and blended education courses, instructors can connect with all of their students throughout a week or other set period of time in which the AOD takes place. Instructors also can correct misconceptions, expand on concepts, ask questions, and/or review and reflect on students' learning based on their posts in the AOD. They might also ask students probing questions to help them delve deeper into the content by providing examples, categorizing information, debating various sides, substantiating their ideas, creating concept maps, and/or making connections to the real-world or other relevant resources. All of these strategies can help promote greater learning of content.

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## WHAT ARE THE CHALLENGES OF AOD?

There are several challenges to incorporating AOD in online and blended instruction. Being aware of the limitations of AOD can help instructors better mitigate the challenges. Some of the challenges associated with AODs include:

1. **AOD ARE ASYNCHRONOUS:** Although this is clearly a benefit for many, this can also be a challenge. If students post when convenient for them, discussions may not seem very continuous. Some students, for instance, might find that waiting for a thoughtful response to a question or comment takes a while, and they lose motivation or fail to remember what the question or comment was that they were hoping a peer would respond to. Moreover, some students might find they are late to a discussion and have little more to offer because of earlier responses.
2. **AOD REQUIRE A LOT OF TIME/READING:** AOD can require a lot of time to read them, not only because of the quantity of posts, but also because of their quality. Some instructors and students might be overwhelmed by having to read lots of posts, have trouble keeping up, or experience difficulties figuring out how to manage their own participation and postings in the AOD. Some might also feel pressure to respond and/or read every post so they do not miss out on learning the content.
3. **AOD QUALITY VARIES:** AOD typically are more informal in nature; therefore, the quality of their posts may not be very good. They may be very wordy or have grammatical or spelling errors that might impede not only comprehension of the post, but also learning about the topic studied.
4. **AOD MIGHT RESULT IN MISUNDERSTANDING:** Even though it seems that communicating in AOD might promote understanding, in some cases, they might result in misunderstanding because there are no visual cues, verbal intonation, or ability to see how others react to one's words. This might happen not only if a student posts a reply that is misunderstood, but it is also possible that some students might even be offended, when that was not the intention! Use of emojis, graphics, links with definitions, among other strategies might help ensure one's good intentions.
5. **DESIGN OF GOOD AOD QUESTIONS/PROMPTS IS CHALLENGING:** It can be very challenging for instructors (or students if they have this responsibility) to develop questions that will keep students' interest during the full duration of a discussion, as well as foster student participation. For example, read the following two questions – which might you consider a strong one and which a weak one? Stronger questions are open-ended, often have no “right” answer, and are applicable to students' real-life.

- a. What are the main characteristics of adult learning theory?

b. Reflect on your own learning experiences in one of your favorite courses and how the instructor incorporated adult learning theory. Be sure to substantiate your ideas and share concrete examples.

6. **SOME AOD FALL FLAT:** Sometimes, the challenge is keeping the discussion going. Some discussions, simply put, fall flat. This might happen because the instructor (or student) developed a question that falls flat because it was answered early and it does not address higher order levels of thinking. It might also happen if some students answer questions so thoroughly that some students feel as if they have nothing new or interesting to contribute.
7. **AOD REQUIRE THE USE OF HARDWARE AND SOFTWARE:** Although one might assume students will only enroll in a course if s/he has the requisite technology, students may not have up-to-date hardware and software making participation in AOD difficult. Also, some AOD may be impossible or difficult to read on all devices.

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## WHAT ARE SOME BEST PRACTICES FOR AOD?

Thinking about how best to design, implement, assess, and engage in AOD is important to their successful implementation in any online or blended learning course. Equally important is communicating expectations for participation in the AOD. Following are several recommended best practices for implementing AOD in online and blended education courses.

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## DESCRIBE PURPOSE

To ensure quality engagement in AOD, it is important for instructors to be clear about the purpose, expectations, and grading criteria for the AOD. For example, is the purpose of the AOD for students to demonstrate application of the content being learned, to prepare for a face-to-face class, or to expand their learning of the content studied? Whatever the purpose of the AOD, instructors should provide an explanation about their purpose. The following is an example of a purpose description for an AOD that an instructor might include to describe the AOD assignment:

**Purpose:** Research shows that students who participate fully in well-designed asynchronous online discussions (AOD) develop a stronger sense of community among their peers and perform better academically (Zhou, 2015). Moreover, AOD help students view course content from different perspectives, foster a shared learning community where students learn from and with one another, and provide a place where they can share questions, answers, ideas, examples, and resources about the content they are learning in a focused, meaningful way.

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## PROVIDE STRUCTURE AND GRADING CRITERIA

Gilbert and Dabbagh (2005) conducted a study examining how the established protocols for participating in and grading of AODs promoted meaningful learning. They found “three elements of structuring online discussions that significantly impacted meaningful discourse ... [which] were, (a) facilitator guidelines; (b) evaluation rubrics; (c) posting protocol items” (p. 16). Facilitator guidelines involves providing the guidelines for the facilitator of the discussion, if it is a student. Assessment rubrics (Wegmann & McAuley, 2014) communicate the grading criteria for participation (see Appendix A for a sample rubric). Finally, the posting protocols refer to not only the quantity,



frequency, and timing of posts, but also appropriate protocols for posting, such as incorporating respectful behavior (netiquette).

Similarly, Salter and Conneely (2015) discovered that structured forums were more engaging than non-structured ones in a study of undergraduate students that compared participation in and student perceptions of structured and unstructured AODs. Therefore, it is important for instructors to be clear about the expectations for students' and instructors' own participation in AODs, as well as to describe how students will be graded. Moreover, instructors should learn about how to craft good questions (Milman, 2009), in addition to a variety of ways to structure discussions so they go beyond simple Q & A. For example, instructors can incorporate compare/contrast, debate, cases, role-playing, and problem-based learning, just to name a few different types of strategies instructors might use.

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## MODEL EXPECTATIONS

Instructors should engage in the same behaviors and practices they expect from their students. For instance, if students are expected to post three times a week every other day of the week, then instructors should ensure they are also modeling these same expectations by participating in the AOD three times a week every other day of the week, too. Also, if the AOD are offered through a particular technology tool such as a LMS or other CMC technology, instructors should ensure students know how to make, read, and manage posts in the AOD tool. Instructors can create a video demonstrating how to use the LMS AOD tool or locate resources that can provide students step-by-step instructions. Most LMS provide job aids or videos with information for both instructors and students who wish to use AOD. For example, the Blackboard LMS has several job aids with videos demonstrating:

1. how instructors can create AOD:  
[https://help.blackboard.com/Learn/Instructor/Interact/Discussions/Create\\_Discussions](https://help.blackboard.com/Learn/Instructor/Interact/Discussions/Create_Discussions)
2. how students can post to AOD:  
<https://help.blackboard.com/Learn/Student/Interact/Discussions>

Clarke and Bartholemew (2014) conducted a study using an analytical tool to investigate participation in AODs by instructors. Instructor interactions in the AODs involved postings that were categorized as “cognitive,” “teaching,” and/or “social” (p. 6). In “cognitive posts,” instructors asked questions that required students to inquire into the topic at a deeper level. On the other hand, “teaching posts” involved instructor elaboration and clarification about the course content/topic studied in the AOD. In “social posts,” instructors shared their personal experiences and provided encouragement. Yet, it is important to emphasize that quality teaching posts were found to be more important than the quantity of teaching posts. For example, “instructors who posted less frequently but with more purpose had a higher level of critical thinking in their discussions” (Clarke & Bartholemew, 2014, p. 18). Therefore, instructors should think thoughtfully and strategically about the quality and type of posts (i.e., cognitive, teaching, or social) they make to promote AOD interaction.

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## MONITOR PARTICIPATION

Instructors should ensure that students are participating at the level expected, particularly if points are earned for participating in the AOD. If students' participation is lacking and/or if they do not participate/post at all during the specified time period, then the instructor should contact them to find out if they need help and also understand the participation expectations and grading criteria (this can be presented as a grading rubric – for an example, see

Appendix A). In some cases, the instructor may find that something grave has happened to a student (e.g., a bad car accident); in others, it might be the student is feeling overwhelmed or simply very busy. Whatever the reason, reaching out to students to check on them will help instructors learn what is going on in the student's life that may be impeding her/his learning. Moreover, it will help students understand their instructor cares about them and expects them to participate. However, some students may find themselves too busy to post and willing to lose points. In such cases, instructors should help students recognize what they have to gain from their participation in AOD.

Instructors should ensure that students remain on topic. It is easy for a discussion question to veer off topic. If it does, the instructor will need to decide if the post should be deleted or redirected. If deleted, the instructor should ensure there is a policy in place that has been communicated to students that posts that are off topic or inappropriate may be deleted. To redirect a post, the instructor might comment on a tangential posting simply by re-posting about the topic discussed as a response to the thread.

In many courses, sensitive or controversial topics are discussed and/or opposing views may surface. Clearly, academic freedom, free speech, civility, and respect are important in any educational environment. In these cases, instructors should ensure that postings follow policies and guidelines within the IHE and course. As with off-topic posts, instructors should have a policy in place to remove any posts that are inappropriate. Yet, in some cases, students will not realize that their comments, questions, and or posts are offensive or claim that their ideas should remain because of free speech. In such cases, instructors may use the "offensive" post as a teaching moment to discuss with students. In others, the instructor may remove the post altogether. In either instance, contacting the "offending" student directly to discuss the matter is important. Instructors may also wish to provide resources for students who experience challenges with processing the "offensive posts" such as a university's counseling center. For topics that might be "triggers" for some students (e.g., gun violence, sexual assault), instructors should offer an alternative assignment for those who choose not to participate in the discussion.

---

## DESCRIBE HOW TO MANAGE AOD PARTICIPATION

It is important for instructors to describe how students can best manage not only reading AOD posts by their peers, but also monitoring their own participation. For example, some students might feel overwhelmed reading posts by everyone in the class. Even a course consisting of 10 students can have hundreds of posts within a week. A simple technique students can employ is changing the subject of the post. By reading the subject, they can then determine if the post is worth their time/effort to read (e.g., a post by a student with the subject: "Thanks – I agree" or directed to a specific student may not be directed at the individual student and therefore, may not need to be read or merit a response). Also, students can choose to concentrate on one or two questions instead of all of the questions (Note: In some cases, instructors require their students to respond to all posts—this is why it is important to communicate and model expectations).

Instructors should also encourage their students to read posts. Researchers Goggins and Xing (2016) found the following:

Though the research community usually focuses on number of posts students make when examining student learning in using online discussion tools, our research demonstrates that the number of posts students read, the time delay for responding, and the time spent on reading posts also matters. (p. 249)

Consequently, instructors should explicitly advise their students to read as many posts as possible and allocate sufficient time for reading them thoughtfully.

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#### DESIGN QUALITY QUESTIONS OR PROMPTS

Online and blended education instructors must create AOD questions and/or prompts that help students learn the content. However, this is not an easy task. Berge and Muilenburg (2002) recommended using Bloom's Taxonomy for developing questions tend to foster higher order thinking. (Note: Bloom's Taxonomy has since been revised, see Anderson et al., 2001). Another framework for developing online discussion questions is the CREST+ model (Akin & Neal, 2007). The CREST+ model "covers the cognitive nature of the question, the reading basis, any experiential possibility, style and type of question, and...ways to structure a good question" (Akin & Neal, 2007, para. 1). Whichever approach is used, varying the types of questions is vital, as well as determining the learning goals of the AOD (Bradley et al., 2008).

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#### ENCOURAGE CONVERSATIONAL STYLE

In a review of the literature on AODs, Fear and Erickson-Brown (2014) recommended using a conversational style in the AODs, which "means writing in conversational form and style; using personal anecdotes and affective verbal immediacy; the expression of appropriate emotion through the use of capitals, bold, italics; emoticons; and so on" (p. 25). This recommendation is in line with Clark and Mayer's (2016) Personalization and Embodiment Principles that suggests that "people learn better when e-learning environments use a conversational style of writing or speaking ... polite wording for feedback and advice, and a friendly human voice" (p. 179).

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#### INCORPORATE STUDENT FACILITATION OF DISCUSSIONS

Several researchers have touted the benefits of student-facilitated AODs (Milman, 2009; Milman, Hillarious, & Walker, 2012; Snyder, & Dringus, 2014). Student-facilitation of AODs involves students serving in the facilitator role for the discussion. It is important to ensure that student-facilitators are informed of the expectations and grading criteria, but also that they are set up for success by being provided content and discussion questions ahead of time. Also, it is important for student-facilitators to know who to contact for support (even if to ask for advice about how to respond to a peer's post). Appendix B provides a sample assignment description for student facilitation of AOD, as well as a reflection "debrief" assignment.

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#### PARTICIPATE IN THE DISCUSSIONS!

Many investigators have found that instructor presence and participation in AOD can impact students' learning and participation (deNoyelles, Zydney, & Chen, 2014; Kayler & Weller, 2007; Swan, 2002). However, frequency of participation is not the greatest factor influencing student participation and learning. For instance, Nandi, Hamilton, and Harland (2012) found that "periodic feedback from instructors is always valued highly by students and keeps the students on track" (p. 23). Therefore, instructors should be more concerned with ensuring they are posting periodically rather than worrying about how frequently or how many posts they might make.

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## SUMMARY

The use of AOD in online and blended education courses in IHE shows great promise for building community, fostering deep learning, and providing student-student, student-content, and student-instructor interaction. However, there are many different types of tools that can be used for housing them, as well as numerous approaches that instructors can take for structuring them. This chapter provided information about some of the tools, research, challenges, benefits, and recommendations for using AOD in IHE. As technologies change and as new ones are developed, so will the tools for hosting AOD. Therefore, it will be important for instructors to learn about their affordances and challenges, as well as experiment with new tools to ensure they best meet the needs of their students.

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APPENDIX A: AOD GRADING RUBRIC

Grading Criteria	Excellent (2 pts)	Good (1 pt)	Needs Improvement (0 pts)
<b>Timing (When post is made)</b>	Student posted before/on <u>and after</u> Saturday (1 pt)	Student posted on and after Sunday (.50 pt)	Student posted on or after Monday (0 pt)
<b>Quality and Quantity of posts</b>	Student posted three or more quality* discussion postings. (1 pt)	Student posted two quality* discussion postings. (.50 pt)	Student posted one or no quality* discussion postings. (0 pt)

Total possible points each week: 2

Each week starts Wednesday 12AM EST and ends on Tuesday 11:59PM EST.

*\*Quality posts are those that involve:*

- Responding thoughtfully to a topic/question,
- Posing a thought-provoking question related to a topic; and/or
- Providing links and resources related to a topic and an explanation of the link/resource(s) shared (simply posting a link or resource without an explanation does not “count” as a quality post).

Posting of “agree,” “great job,” or “thanks” types of posts are not considered quality posts, nor are they “counted” as postings that go towards your posting grade.

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## APPENDIX B: AOD FACILITATOR ASSIGNMENT DESCRIPTION AND GRADING RUBRIC

**Purpose:** Research shows that online students who moderate (facilitate) online discussions develop a deeper understanding of the content and strategies for facilitating online discussions. They also further cultivate their leadership and collaboration skills and abilities while also contributing to a shared learning community where they learn from and with their peers. The purpose of the debrief statement is for you to reflect on your experience co-facilitating one week's discussion, as well as describe how responsibilities were shared among all co-facilitators.

**Discussion Facilitation & Debrief Statement (4%) [Due when assigned]** - You will be asked to co-facilitate one week's discussion. To earn the full points, you must:

1. plan and prepare by (with your co-facilitators):
  - a. reviewing the draft lecture;
  - b. communicating w. your co-facilitator about distribution of responsibilities; and
  - c. examining the 3 open-ended questions included in the email sent with the draft lecture - these will be the questions you co-facilitate.
2. co-facilitate the discussion by:
  - a. guiding the discussions by posting thought-provoking questions and interjections;
  - b. expanding upon the other students' viewpoints, provide help, and feedback;
  - c. promoting politeness and courtesy;
  - d. being supportive and complimentary to those who provide good effort, and responding to as many postings as possible.
3. submit a 250-350 word debrief statement that describes:
  - a. how responsibilities were divided/shared between you and your partner(s), and
  - b. what you learned about the content and co-facilitation from this experience.

**Submission:** Submit your debrief statement no later than the following Tues after your facilitation week ends. Note that each facilitator must upload his or her own statement - this is an assignment required by each individual!

**Grading Criteria:** This assignment will be graded using the Co-Facilitation Rubric.

**Note:** You should not answer the questions for the week's discussion as would be expected by your peers who are not co-facilitating. Also, you will you not earn points for "weekly participation" in discussions. Instead, you will earn a facilitation grade.

**Co-Facilitation Grading Rubric**

Criteria	Excellent	Satisfactory	Unsatisfactory
Facilitation of Discussion 3 pts	The facilitator meaningfully and without prompting from her/his partner, IR, or SL, successfully co-facilitated the week’s discussion by: <ol style="list-style-type: none"> <li>1. guiding the discussions by posting thought-provoking questions and interjections;</li> <li>2. expanding upon the other students' viewpoints, provide help, and feedback;</li> <li>3. promoting politeness and courtesy;</li> <li>4. being supportive and complimentary to those who provide good effort, and</li> <li>5. responding to as many postings as possible.</li> </ol>	The facilitator required some prompting and/or guidance from her/his partner, IR, or SL, to address the requirements in the “Excellent” section.	The facilitator required prompting and/or guidance several times from her/his partner, IR, or SL, to address the requirements in the “Excellent” section, or was absent from the discussion.
Debrief Statement (Individual—this is not to be completed as a team) 1 pt	The facilitator submitted a 250-350 word debrief statement describing: <ol style="list-style-type: none"> <li>1. how responsibilities were divided/shared between you and your partner(s), and</li> <li>2. what you learned about the content and co-facilitation from this experience.</li> </ol>	The facilitator submitted a somewhat wordy, too brief, and/or unclear debrief statement addressing the requirements in the “Excellent” section.	The facilitator failed to submit a debrief statement or submitted one that is very wordy, too brief, and/or unclear, and/or that failed to address the requirements in the “Excellent” section

NOTE: Co-facilitators should not answer the questions for the week they are co-facilitating. They will not earn “student participation points” either; however, they will earn a co-facilitation grade. You will not see any points recorded during your co-facilitation week for student discussions.

**Co-Facilitation Grading Rubric**

Criteria	Excellent	Satisfactory	Unsatisfactory
Facilitation of Discussion 3 pts	The facilitator meaningfully and without prompting from her/his partner, IR, or SL, successfully co-facilitated the week’s discussion by: 6. guiding the discussions by posting thought-provoking questions and interjections; 7. expanding upon the other students' viewpoints, provide help, and feedback; 8. promoting politeness and courtesy; 9. being supportive and complimentary to those who provide good effort, and 10. responding to as many postings as possible.	The facilitator required some prompting and/or guidance from her/his partner, IR, or SL, to address the requirements in the “Excellent” section.	The facilitator required prompting and/or guidance several times from her/his partner, IR, or SL, to address the requirements in the “Excellent” section, or was absent from the discussion.
Debrief Statement (Individual—this is not to be completed as a team) 1 pt	The facilitator submitted a 250-350 word debrief statement describing: 3. how responsibilities were divided/shared between you and your partner(s), and 4. what you learned about the content and co-facilitation from this experience.	The facilitator submitted a somewhat wordy, too brief, and/or unclear debrief statement addressing the requirements in the “Excellent” section.	The facilitator failed to submit a debrief statement or submitted one that is very wordy, too brief, and/or unclear, and/or that failed to address the requirements in the “Excellent” section

NOTE: Co-facilitators should not answer the questions for the week they are co-facilitating. They will not earn “student participation points” either; however, they will earn a co-facilitation grade. You will not see any points recorded during your co-facilitation week for student discussions.



CHAPTER  
11

# ENHANCING STUDENT ENGAGEMENT IN ASYNCHRONOUS ONLINE COURSES

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MAINE

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## INTRODUCTION

Many faculty and students refuse to teach or take courses online because of their perception that the online environment lacks opportunities for student-student and faculty-student interaction (Vivolo, 2017). However, easy to use and cost effective technologies give instructors the ability to engage with students and enhance their interaction with the content, while giving students ways to interact with each other, even in asynchronous online courses. As Bowen (2012a) suggested, “Technology provides tools to motivate students for deeper critical exploration, application, and integration of the information now available to them, and e-communication provides strategies for building intellectual communities” (p. 130). A key factor in this quest is to structure classes so that everyone has to participate and is rewarded for doing so (Bowen, 2012b). In this chapter, we briefly describe strategies and techniques that can be deployed to increase student-content, student-student, and student-instructor interaction and engagement in asynchronous, online courses using readily available tools that do not increase costs to students. As with many pedagogically innovative practices common online (Vivolo, 2007), these practices are consistent with cognitive science regarding how people think and learn (Miller, 2014) and can often be adapted readily to other modalities of instruction (e.g. hybrid, synchronous online, or face-to-face).

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## STUDENT-CONTENT ENGAGEMENT

Perhaps it is a truism that a student’s interaction with the content is the *raison d’être* for a college course! Regardless of one’s opinion on this point, in our experience advising students taking conventional face-to-face classes, especially those students who have not met their own academic expectations, many admit to avoiding engagement with the content (e.g., not reading the textbook, routinely skipping in-person lectures, failing to complete required assignments). In large lecture halls filled with students (sometimes hundreds), it can be difficult to provide the personal attention that might benefit students. Online, there are a variety of strategies and techniques that can be used to encourage student-content interaction.

The test function in Blackboard, which is similar to many Learning Management Systems (LMS), offers faculty the opportunity to provide on-the-spot feedback to students responding to multiple choice questions. When the correct alternative is chosen, students can see “bravo” or “good choice” or some other brief and encouraging feedback provided by the instructor. More importantly, choosing an incorrect alternative can trigger feedback that refers the student to specific material (e.g., a particular reading or video, a specific section of a chapter). Such feedback encourages students to re-engage with specific content and deepen their understanding (Miller, 2014). Rather than provide the correct answer, this approach encourages students to discover the answer for themselves.

Another strategy for increasing student-content interaction is to offer students multiple attempts on assessments (Miller, 2014). This is especially easy to accomplish for quizzes or exams that are taken online and automatically scored. For example, in our introductory level course, students are expected to complete a weekly quiz via the test function in Blackboard. Allowing students the opportunity to take these quizzes more than once lowers the stakes (and hopefully the anxiety) and allows weekly quizzes to serve as a formative assessment and study guide, helping students determine what they do (and do not) know. Each quiz covers the assigned readings, videos, and other materials for the corresponding week. To increase engagement with the content, students are encouraged to read the material and watch the lectures, then take the relevant quiz for the first time early in the week. Their success (or lack thereof) on the quiz can then be used to guide their next steps. If they did not achieve the desired score, they are encouraged to spend more time studying, especially the material related to the questions they missed. They can take the quiz again, repeating this process before the deadline for a particular quiz. Blackboard allows the instructor to determine the number of attempts (we usually allow two or three) and which score will count toward the final grade (e.g., last, highest, lowest, first, average).

To allow students multiple attempts at quizzes and exams requires a large pool of quiz questions. When using large publisher-provided test banks, instructors may be tempted to allow students unlimited attempts. However, in our experience this appears to exacerbate counterproductive behavior, like taking quizzes repeatedly in rapid succession at the last minute, in hopes of a higher score, rather than encouraging more productive approaches to mastering content. Although this behavior occurs in some students even when the number of attempts is limited, our experience suggests that limiting the number of attempts to two or three increases the probability that students will follow the provided guidance and temporally space their attempts.

A third strategy for encouraging student-content interaction is to offer extra credit for identifying errors in course materials and assessments.<sup>1</sup> For example, syllabi can include language like the following:

You may find minor errors in some of the quizzes or in the other online materials you will engage during the course, often due to technical glitches and other issues that are beyond the instructor's control. If you find an error that I can fix, bring it to my attention. Indicate where you spotted the problem (e.g., the chapter quiz number and the first few words of the question). If you are among the first to tell me about it, you will earn an extra credit point.

Similarly, course management systems like Blackboard require literally thousands of option selections and (as you may have experienced) technology does not always interface perfectly. Please let me know if you find an error – I will correct it (if I can) and give you an extra credit point for helping me to improve the experience for other users. On rare occasion, the technology designates a wrong answer as the “correct” answer on a quiz question. If you are convinced you have found an example of such an error, please email me. Be certain to indicate the course, the quiz number, and the first few words of the question in addition to your explanation as to why your selected answer is a better than the “correct” answer. If I agree with your assessment, you will earn an extra credit point.

This approach encourages students to become co-creators of their learning experience, at least at a minimal level. It does, in fact, allow the instructor to correct errors that might otherwise distract or annoy other students in the

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<sup>1</sup> The first author is grateful to the late John Broida for suggesting this strategy.

class and to do so before the impact of the errors becomes unmanageable or disruptive. Implicitly, it also gives students permission to make (and hopefully correct) their own mistakes. Finally, it creates opportunities for faculty to interact with individual students, a topic to which we will return.

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## STUDENT-STUDENT ENGAGEMENT

Some students are reluctant to take coursework online due, at least in part, to their perception that interaction with online classmates will be limited (Vivolo, 2017). Contrary to this expectation, a LMS offers a variety of mechanisms that can be employed to encourage student-student interaction thereby increasing students' social presence in the course and their satisfaction with the medium (Gordon, 2017). They allow instructors to monitor, archive, and assign points to (e.g., grade) student-student interaction in ways that are very difficult to replicate in a face-to-face environment. For example, course requirements can include graded discussion threads and graded peer feedback on course artifacts.

Blackboard's discussion board function makes it easy for instructors to manage, archive, and grade these activities. For example, on the discussion board, students can be required to post a response to a prompt provided by the instructor by a specified deadline and then reply in a substantive fashion to a specific number of other students' posts. In addition to text-based replies, students can also be encouraged to reply using video if the instructor wishes to do so and the LMS allows. It is important to operationally define "substantive" in this context so students know their posts need to include something more than "good job" or "I agree." For more complex assignments, a grading rubric can be shared with students in advance (Stevens & Levi, 2012). Such rubrics can also make assigning points to (even large numbers) of discussion threads relatively painless (even if time consuming) for instructors or teaching assistants. They can also be used by students to assess their own work (Ko & Rossen, 2017).

Similarly, we frequently require students to provide peer feedback on course artifacts. This can be done in the Blackboard's discussion board as well. Regardless of the length or complexity of the writing assignment, students can be required to post their artifact on the discussion board and subsequently provide peer review or feedback to a specified number of peers on the same assignment. We frequently ask students to provide such feedback on drafts of complex assignments. That way students receive feedback from the instructor as well as from their peers that they can incorporate into their final draft regardless of whether the assignment is a book review, wiki entry, letter to the editor, lab report, etc. It may be useful to point out that students may receive contradictory feedback, in this context, and can be empowered to consider the alternatives and make whatever editorial decision they think best serves their audience and the purpose of the assignment.

Although graded discussion threads and required peer review encourage student-student interaction regarding course content, some students seek less formal interactions with their peers as a way to enhance their social networks among other non-academic goals (Lewis, Dikkers, & Whiteside, 2017; Whiteside, Dikkers, & Lewis, 2017). These less formal interactions can be encouraged in a variety of ways. For example, we often encourage students to post a brief introduction or bio (and to respond to some of their classmates posts) during the first week of class (e.g., Gunawardena, 2017). If given options, some students will post video whereas others prefer text. Even without assigning a point value to such a post, in our experience, most students appear to do so with pleasure. We often encourage students to take note of others who share their interests or background or who posted something of particular interest so that they can use the email function in Blackboard to further their interaction. (This simple exercise also accomplishes another important goal, namely, demonstrating students' knowledge of how to navigate the discussion board.)

In addition to providing students with a mechanism through which they can potentially solve a problem quickly, perhaps especially when the instructor is not immediately available, a help wanted/help offered forum (Gunawardena, 2017) can promote productive, but less formal, student-student interaction. The discussion board in our classes often includes a forum with the following instructions.

If you have a question, need some assistance, or have experience or expertise to offer, post a note on the Help wanted...Help offered forum! If you subscribe to this forum, you will be alerted to new posts via email. Because the instructor isn't always online, especially in the evening and on weekends, it may also be a way to get an immediate answer to a question. To subscribe, simply open the forum and click on the "subscribe" button.

You are also welcome to post an offer of assistance. For example, if you are willing to help others make connections to people in your network, have technological expertise to share, or are skilled in the kind of research required for this course, you can let others know of your willingness to assist through this forum.

Students have used this forum to resolve minor technical problems, announce local events (e.g., lectures, workshops) relevant to course content, request clarification on assignment instructions, and organize independent study groups via social media, among other things. Because these discussion threads are visible to all students in the class, it also allows the instructor to answer a question once rather than repeatedly to any number of individual students.

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## STUDENT-INSTRUCTOR ENGAGEMENT

In some respects, student-instructor interaction is the most “expensive” type of engagement. After all, there is often only one instructor and there are usually many students. Regardless, there are a variety of ways instructors can make their virtual presence known in asynchronous online classes even if there are few, if any, opportunities to meet face-to-face or in real time (Whiteside, Dikkers & Swan, 2017). These include, but are certainly not limited to, weekly announcements, instructor commentaries, and participation monitoring.

We use weekly announcements in much the same way many faculty use the first few minutes of a face-to-face lecture. We typically send the weekly announcement early Monday morning, especially in courses where the default deadline for weekly assignments is 11:59 PM on Sunday. Blackboard allows instructors to deliver announcements to students’ email inboxes. Announcements can also remain on the Blackboard announcement page for the duration of the week (or for whatever period an instructor deems appropriate). They can also be written well in advance, deployed on a schedule, and edited for reuse in subsequent semesters. In fact, we usually draft a weekly announcement for each week of the semester while designing the course and edit or update each message as it is made available to students.

Although some users advocate using “text-short” emails (e.g., Boettcher & Conrad, 2016), weekly announcements can vary in length depending upon the amount of information that needs to be delivered. Not unlike the introduction to a lecture in a face-to-face class, these messages can include a wide range of information (e.g., closing the loop on last week’s content, summarizing feedback on a homework assignment, briefly introducing this week’s content, deadline reminders, reminders regarding underutilized LMS functions, or study strategies that facilitate online learning).

Whether course material is presented in a conventional textbook, eBook, or as curated collections of readings from a variety of sources, the instructor's presence and engagement with students can be highlighted by providing an instructor commentary for each unit. We think of these commentaries in much the same way as the commentaries museum curators provide when mounting an exhibition. They vary in length depending on the context. However, they can include highlights of the most important points, new material (especially when a reading of the appropriate length and complexity is not available on an important topic), and points of disagreement among scholars, among other things. This is exactly the kind of content that instructors use to make a live lecture more engaging and to put their personal stamp on the material. In addition to enhancing student-instructor engagement, such commentaries act as a road map and a frame of reference for students as they progress through the assigned material.

Blackboard also collects information on student activity which provides instructors the opportunity to monitor student participation and potentially shape student behavior early in the course. For the first few weeks, we carefully monitor student activity in Blackboard. Students receive an email alert from the instructor when they miss an assessment deadline or have failed to log in for three or four days. In addition to highlighting the instructor's presence, closely monitoring student engagement provides an opportunity to troubleshoot. This is especially important for students who are new to online learning. Although some students quickly admit to forgetting to take a quiz or submit other required artifacts, responses to these early alerts include a wide variety of concerns, most of which are easily remedied with a bit of extra coaching (e.g., "I couldn't find the quiz link," "I posted the assignment but forgot to click SAVE," "I'm having trouble accessing the eBook," "I can't open the videos"). By monitoring student engagement through the LMS, the instructor can help students more quickly adapt to the online environment. In our experience, most students welcome these interventions and are grateful for the support.

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#### APPROACHES FOR BRINGING IT ALL TOGETHER

As should be clear from some of these examples, some approaches can increase student engagement with some combination of the three (not so) discrete kinds of engagement discussed above. In this section, we discuss three approaches that help students engage with the content, other students, as well as the instructor.

VoiceThread (<http://voicethread.com>; Ko & Rossen, 2017; Vickers & Shea, 2017) is an inexpensive, commercially-available product that allows instructors to create narrations for the slide decks they might otherwise be using to structure a conventional lecture. One important advantage to this product over other approaches to lecture capture is that the creator can alter, add, or replace individual slides without the need to re-record an entire lecture! So, if a student identifies an ambiguity in the narration or the material on a slide requires updating, specific changes can readily be made without needing to re-record the lecture from scratch. Using VoiceThread, students also have control over the pace at which they advance the slides.

Depending on instructor preferences, students can attach their questions and comments (using voice or text) to individual slides. In doing so, they share their questions and comments with the instructor as well as other students and others can add to the discussion thread. In short, VoiceThread allows students to engage actively with content by commenting on or asking questions about specific slide content. Such comments also allow them to engage with the instructor or with other students in ways that are not possible with other approaches to recording lectures.

Social media of various sorts can be also used to encourage students to engage with content, other students, and the instructor (Boettcher & Conrad, 2016). As noted earlier, students can set up study groups using Facebook-- independent of the course, or the instructor can create such groups and invite students to join. I (the first author)

ask students to engage further with content, with me, and with other students by inviting them to follow me on Twitter or to search for or post course-relevant tweets using a hashtag (specifically created for this purpose) that is relevant to course content. We consider this a digital equivalent for the “suggested readings” lists that sometimes appear at the end of textbook chapters. In addition to sharing additional material with students, this is an easy way to track material that an instructor might like to embed in a future iteration of a frequently taught course (Carrigan, 2016). Because it is independent of course enrollment, it also gives students an opportunity to remain engaged with course-related content, if they wish to do so, long after the course ends.

Although online lab work presents unique challenges (Ko & Rossen, 2017), faculty in the physical sciences have spent considerable energy creating online lab-like activities that can be embedded in asynchronous online courses (e.g., Kennepohl & Shaw, 2010). Some textbook publishers (e.g., Pearson) also are invested in this effort. The availability of such activities in the social and behavioral sciences is much more limited, especially in introductory psychology courses (Peterson & Sesma, 2017). However, The Society for the Teaching of Psychology (<https://teachpsych.org/>) is making progress in filling this void.

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## CONCLUSION

As opportunities for learning online become available to more and more students (Lederman & Jaschik, 2017) in public institutions as well as private, the importance of efforts to enhance online engagement should not be underestimated. The federal government requires regular and substantive interaction between students and faculty as a basis for granting financial aid (see Lieberman, 2017). National organizations, like *Quality Matters* ([www.qualitymatters.org](http://www.qualitymatters.org)), include indicators of student engagement in the standards and rubrics they use to assess the quality of online courses and programs. Perhaps most importantly, students expect and benefit from it (e.g., Bowen, 2012a; Miller, 2014).

The online learning environment presents challenges for learners and instructors alike. But, it is our experience that with a degree of forethought and intentionality in course design, it provides opportunities as well. By focusing on the elements of the dynamic, triadic relationship between the instructor, the student, and the content, we have identified approaches and applications of sound pedagogy and effective technologies that have increased engagement for students, even in our high enrollment, asynchronous, online courses.

Practitioners are well aware of the constraints of the online learning environment, particularly in regard to creating a sense of connection and being there for their students. And while no LMS is perfect, we have undertaken an iterative process of investigating and piloting the use of many of Blackboard’s tools with the intention of enhancing student engagement. We are confident that the recommendations presented here have accomplished just that.

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CHAPTER  
12

# LEVERAGING THE FEATURES OF LEARNING MANAGEMENT SYSTEMS (LMSs) IN PSYCHOLOGY COURSES

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## INTRODUCTION

Extant research lacks specific statistics regarding the annual number of psychology students enrolled in any online course(s) at any level of postsecondary education, as well as the number of psychology students enrolled in hybrid or fully online psychology degree programs. How technology is used in the teaching and learning of specific psychology content also is lacking in the research. Psychology continues to be one of the most popular undergraduate majors (National Center for Education Statistics (NCES), 2015). More than one in four postsecondary students are enrolled in at least one online course, with 83% of these students studying at the undergraduate level (Allen & Seaman, 2017). More specifically, a recent survey of regionally accredited, non-profit, undergraduate institutions indicated 26% of psychology courses were offered online, representing approximately 17% of undergraduate psychology credits earned in the 2016-2017 academic year (Hailstorks et al., 2017). Although enrollment rates in graduate-level, online psychology courses and programs are unclear (Newhouse & Cerniak, 2015), the Commission on Accreditation of the American Psychological Association (APA) acknowledges the role online predoctoral coursework has in supplementing traditional, face-to-face (FTF) instruction (APA, 2017; Clay, 2012). Taken together, these statistics suggest many psychology students have or will take an online course at some point in their education.

Web-facilitated FTF courses, specifically those utilizing web-based tools, and hybrid and fully online courses delivered by learning management systems (LMS) come in myriad forms, and LMSs increasingly are seen as but one point on an evolving continuum of the modern learning ecosystem (EDUCAUSE, 2012). For the purposes of this chapter, selected research focused on closed enrollment online courses part of degree-granting programs will be reviewed, as opposed to that pertinent to classes with open or free enrollment, such as massive open online courses (MOOCs). To address the needs of readers who range in familiarity with and experience using LMSs at any level of postsecondary psychology education, and who may teach in FTF, hybrid, or fully online programs, this chapter will: provide a brief overview of the different types of LMSs; review some of the features embedded in many current LMSs; explore how LMSs aid student learning, faculty's management of courses, and program development and oversight; and discuss challenges encountered by and recommendations for users of LMSs.



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## OVERVIEW OF LMSs

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### CLASS FORMAT AND LMSs

Whether the course is delivered solely in an online, distance education (DE) format or through a hybrid learning experience, also referred to as a blended course combining scheduled, periodic, in-person contact with online learning, a LMS will be utilized. LMSs also are used in many FTF classes. Referred to as web-facilitated courses, faculty may use the LMS as an adjunctive tool to complement and support the teaching and learning occurring in FTF settings.

Wright, Lopes, Montgomerie, Reju, and Schmoller (2014, p. 3) define a LMS as a “comprehensive, integrated software that supports the development, delivery, assessment, and administration of courses.” An LMS should offer functions and features aligning with institutional priorities, the range of degree programs and educational delivery methods offered at the institution, and individual program needs (Wright, Lopes, Montgomerie, Reju, & Schmoller, n.d.). While a discussion of the criteria used by institutions to select an LMS is outside the scope of this chapter, Wright et al. (2014) discuss the advantages and disadvantages of each LMS type.

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### TYPES OF LMSs

There is considerable variability among LMSs, also referred to as course management systems (CMSs), course delivery systems (CDS), or e-learning platforms. Among other characteristics, some LMSs may be: better suited to synchronous or asynchronous interaction; focused on content, activity, or networking; accessible on mobile devices; and, proprietary (e.g., BlackBoard), open-source (e.g., Moodle), or cloud-based systems. Cloud-based LMSs may be a newer term warranting clarification of two of its common definitions. Some LMSs may require installation on an institution’s servers, whereas others are cloud-based, hosted on the Internet, and accessed via a service provider’s secure website (Wright et al., 2014). Some also define cloud-based LMSs as an alternative to proprietary and open-source LMSs, in that institutions can pick from an array of existing, often free, web-based “resources that might include social bookmarking tools, document sharing applications, social networking sites, timeline tools, and media options” (EDUCAUSE, 2010, p.1). Thus, these are referred to as LMS alternatives (EDUCAUSE, 2010). For example, a class project may divide students into groups and require them to develop collaboratively a course Wiki page that will provide future users with video-based material. In doing so, students may use Skype for synchronous meetings; Dropbox to share their respective work; and YouTube to share the presentation. (For a list of the top 100 web-based tools used in education, please see Hart (2016).)

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### LMS AS A ONE-STOP SHOP

There are some obvious advantages to using the functions and features embedded within a given LMS. Learning how to use effectively any new technology takes willingness, time, and practice. If students and faculty are directed to use a single system, their time and efforts are focused on becoming acquainted with and eventually mastering that single system. This decreases confusion about where to go for course information or assignment details, for example, and familiarity with some LMS features may facilitate the learning about and use of others embedded within it. Also, users likely will have one login name and password, which is helpful when needing to access and participate in class at different times of the day, across multiple computers, or across devices, should the LMS be compatible with mobile technology.

Institutional information technology (IT) departments also can be alerted readily to any access difficulties users experience, prompting institution- or program-wide announcements that the LMS is offline or under repair. The same cannot be said about access to or use of open web-based tools. Students use different types of computers, browsers, or other mobile devices that may be or will become incompatible with the continually evolving range of web-based tools and applications. This may impact adversely some students' ability to engage in class and complete individual or collaborative assignments.

When programs, individual courses, or specific faculty require students to use a number of tools and resources external to the LMS, students may experience discontinuity in the learning process from course to course. The locus of control also shifts from the institution to individual faculty and students to locate, learn about, practice using, and troubleshoot those tools or applications (EDUCAUSE, 2012). In many instances, time spent mastering different technology is time diverted from teaching and learning psychology course content for faculty and students, respectively. Capitalizing on existing features of, and thoughtful use of additional web-based applications within, the LMS may facilitate course engagement and course satisfaction for students and faculty alike. Accordingly, the remainder of this chapter will focus on leveraging the embedded features and functions common to many current LMSs.

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## HOW LMSs CAN BENEFIT STUDENT LEARNING

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### VIRTUAL REPOSITORY

Whether used adjunctively or to deliver a course in part or in its entirety, the LMS provides faculty and students with a single, virtual location that can serve as a repository of course documents, such as the syllabus, and programmatic and institutional resource information, including library databases and institutional policies. Other essential information can be housed there, too, including weekly announcements, recommended resources, and recently published research.

While faculty teaching blended and fully online courses typically are required to post weekly announcements, FTF faculty may want to do so as well, as this provides students with a published record of information delivered initially in-person. Similarly, students in blended and fully online courses routinely submit assignments to the LMS, and faculty, using embedded editing tools (e.g., highlight, text comments), can provide detailed formative and summative feedback. In addition to decreasing paper waste, centralizing all work and feedback in one virtual location permits students and faculty to see if feedback from a prior assignment is applied to future ones, and the grade book provides a handy, at-a-glance visual representation of how a given student has progressed over the duration of the term.

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### ADDRESSING LEARNING STYLES, NEEDS AND PREFERENCES

While research pertinent to learning styles, preference for course format, and online course completion rates is mixed (Newhouse & Cerniak, 2015), LMS-delivered courses can appeal to different learning styles. Text-based materials likely will have an indefinite place in online learning, just as they do in FTF courses, and course developers and faculty can capitalize on the wide range of audio and visual-based learning materials available at this time. For example, faculty can embed links to podcasts, TED talks, and YouTube videos, among other resources, placing students one-click away from required or recommended materials. Faculty also can provide written transcripts of

these materials, if needed, for students with a preference or need for text-based materials. Doing so helps to address the nuanced needs of students with ability differences, such as those who are deaf/hard of hearing.

Similar to flipped classrooms, many assignments used in LMS-delivered courses require students to demonstrate their understanding and application of information about which they have learned (Clay, 2014). For example, weekly discussion forums are a common component of hybrid and DE courses. By a designated deadline, students must reply to question prompts in a discussion forum, and the requirements may include word counts, a specific number of citations stemming from assigned readings, and the integration of additional scholarly research students must locate. After completing the assigned readings, students have the opportunity to reflect on the material and conduct additional research before demonstrating their understanding to the class (Al-Shalchi, 2009). Subsequently, students typically are required to read and reply to some peers' initial discussion posts. This blend of independent and collaborative investigation and discussion also appeals to some of the learning styles and needs evinced in a modern classroom.

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#### ACADEMIC INTEGRITY & WRITING SUPPORT

A primary focus of postsecondary faculty's efforts is students' original academic writing, and ensuring the integrity of students' work is a prominent concern in DE (Howell, Sorenson, & Tippetts, 2009). To address this, many LMSs seamlessly integrate plagiarism detection software (e.g., TurnItIn, Plagscan); papers submitted to the LMS are checked automatically for originality, permitting faculty to assess academic integrity and facility with APA style. Before deadlines, students can submit written assignments, review the associated reports, and edit specific passages before grading occurs.

This may not be the case for other assignments routinely used in FTF, blended or online courses, however. For example, checking the originality of the content of discussion posts or PowerPoint presentations may not be possible within a given system. Perhaps, additional academic integrity tools suitable to a wider range of assignment types will be available in the future. To support the originality of discussion posts in the meantime, faculty may use an embedded feature requiring students to post first to a discussion forum before seeing peers' responses.

Some institutions also subscribe to online writing tutoring services (e.g., Smarthinking). In advance of deadlines, students electronically submit written assignments to a trained third party to receive personalized writing feedback primarily focused on grammar and composition. These resources can be advertised directly within the course, programs can promote its use, and faculty may require specific students use this or other institutional-based writing assistance programs.

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#### DIVERSE LEARNERS

The postsecondary student body increasingly is diverse in terms of all demographic variables, such as ethnicity, age, and ability level (Betts, Cohn, Veit, Alphin, Broadus, & Allen, 2014; Clinefelter & Aslanian, 2016; EDUCAUSE, 2016; Heitner & Jennings, 2016; Kumi Yeboah & Smith, 2016), and other relevant statuses characterize these modern learners, including: active duty military personnel and veterans (NCESb, 2015); and those working in positions or fields with unpredictable or shifting schedules, such as nursing (Costello et al., 2014) or law enforcement. Moreover, research consistently indicates the majority of students currently enrolled in higher education are non-traditional students (NCESb, 2015; Pelletier, 2010), thereby making non-traditional learners the new traditional students (Smith, 2013) across all learning formats. Non-traditional students typically are defined as having membership in one or

more of the following groups: they did not obtain a traditional high school diploma; they delayed enrollment into postsecondary education; they attend school on a part-time basis; they work full-time; they are financially independent for the purposes of financial aid; they have dependent(s); and/or they are a single parent (NCESb, 2015). While the term “non-traditional student” continues to be used for federal data collection and record-keeping purposes, Smith (2013) asserts the use of “post-traditional student” to be a more empowering term acknowledging students’ diversity and wide-ranging experiences as a “value-add,” rather than aberrations within the higher education landscape. To be consistent with the majority of research published to date on this student group, however, the term non-traditional will be used throughout the remainder of this chapter.

Given approximately 70 to 85% of current college students possess at least one non-traditional student characteristic (NCESb, 2015; Smith, 2013), administrators and faculty of all program types should assume these learners populate contemporary classrooms. This data clearly suggests many students are balancing postsecondary school attendance with work and familial responsibilities, among other life roles, making the option of attending a FTF program, one requiring students to be on-campus on (multiple) specific day(s) at specific time(s) challenging, if not impossible. In addition to serving non-traditional students, blended and fully online courses make available educational opportunities to those who are distant from brick-and-mortar institutions. Fully online courses open to international student enrollment further diversify the student body. While most online courses have established deadlines for weekly assignments, often referred to as deliverables, the asynchronous format of many DE courses permits students to complete course activities in line with personal schedules occurring in their time zones.

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## HOW LMSs SHAPE FACULTY’S APPROACH TO TEACHING

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### FACULTY’S ROLE

As early as 1993, scholarly works explored the difference in role and presence of DE faculty, from “sage on the stage” in FTF courses to “guide on the side” in online courses (King, 1993). This difference in role and approach may be more or less evident in a given course depending on several factors, such as institutional and program expectations, guidelines from accrediting bodies, faculty members’ teaching styles, and course content. Another critical role difference concerns hybrid and DE faculty’s course preparation and course facilitation. Many LMS-delivered courses are prepared with all needed materials at the beginning of the term. Some may permit students to see all areas and weeks of the course at once, or specific settings may be used to delay the presentation of material over time. Either way it is generally expected the course is fully developed by the first day of class, impacting the way faculty prepare for class, facilitate course material, and develop their teaching style.

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### COURSE PREPARATION

As in FTF courses, blended and online students can see the syllabus, required and recommended readings, assignments, rubrics, and due dates at the outset of the term. However, faculty teaching FTF courses may have greater flexibility to modify the content of a given week’s class time to reflect or incorporate, for example, newly published research or a current event. While DE faculty also can share this information, requiring students to engage with the material may be limited by the parameters of existing, viewable assignments.

Similar to FTF course materials, the same blended or online course materials may be reused in subsequent terms. For example, the syllabus, required readings and media files, among other components, may be utilized the next

time a course is offered through the LMS. Many LMSs include a function to import or transfer selected materials used in one term to the next, saving faculty some time in course preparation.

Related to this, programs must weigh the advantages and disadvantages of students having access to past DE courses should they need to retake them. For example, students could have access to past discussion forums, complete with former classmates' responses and faculty feedback, and quizzes or tests that may have been auto-graded within the LMS. To support students' development and to ensure the originality of work submitted when retaking a course, programs have some options, including: hiding the prior course from selected students' view; reordering the presentation of quiz items; selecting a different subset of items from the test bank; providing individualized guidance about approaching in a new way the same written assignment; or amending the directions and associated rubric for an assignment for selected students.

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## FACULTY AVAILABILITY AND PRESENCE

Beyond posted class times and office hours, FTF students may not have a keen sense of when their professors are available or working on class-related activities and materials, such as grading. Best practices in online teaching indicate blended and online faculty should post times when they are available for online (e.g., virtual office hours) and real-time contact, via the phone or audio or video conferencing (Keeton, 2004), and they also should clearly post when they are offline. Because online students engage in their courses on days and at times in line with their personal schedules, they may misperceive faculty as being available whenever they are engaged in class or studying. Specifically stating and reminding students of days and times faculty are available and unavailable helps to: clarify and demonstrate faculty's presence in the course; set reasonable expectations for faculty's availability and responsiveness; and facilitate faculty's work-life balance. They, too, can access their classes anytime any day, and determining and abiding by boundaries is important for faculty as well.

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## SYNCHRONOUS INTERACTION

Much research continues to focus on satisfaction and learning outcomes associated with different course delivery methods (EDUCAUSE, 2016; Newhouse & Cerniak, 2015), as well as how much synchronous contact students desire. To address this, many LMSs' features create opportunities for real-time, virtual interaction. Two examples are commonly labeled chats and conferences. Chats tend to be used for unscheduled, informal, synchronous contact with others who happen to be online at the same time. Many LMSs allow users to notify others when they are online, or this is signaled automatically after logging onto the course. Interestingly, many LMSs maintain a log of chat activity; students and faculty who log on at a later time can see when and about what others last chatted.

Conferences, on the other hand, are akin to scheduled, in-person meeting times. Faculty may use this function on a regular basis to host virtual office hours, or to offer focused discussion and activities in specific weeks of a course. Many conference features offer audio- and video capability, screen-sharing, as well as virtual white boards on which attendees can "write," akin to blackboards in traditional classrooms. Seamless integration of these features means users only need to log on to the LMS to participate; there is no need for additional browser windows, usernames and passwords, or facility with other software. Once scheduled, some LMSs automatically display these conferences within the embedded course calendar, providing students with a visual reminder when they next log on.

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## ASYNCHRONOUS INTERACTION

Asynchronous courses and class activities appeal to many students for the aforementioned reasons of balancing school attendance with work, familial and other personal roles and responsibilities occurring in various time zones around the world. LMSs bridge that asynchronicity by tracking the digital footprints students and faculty leave in LMS-delivered courses. Many behaviors are viewable and time-stamped, thus, students using LMSs can see when faculty reply to discussion boards, post announcements, or return graded assignments. This helps to demonstrate faculty's presence and engagement to students.

Faculty also can provide more personalized contact to students through use of other audio and video LMS features. In addition to embedding presentations or resources with audio and video accompaniment, faculty can: record audio or video class announcements; provide audio or video replies to discussion posts; and, provide audio or video feedback on graded assignments. Depending on the way learning activities are framed, students also may be required or have the option to provide audio and/or video accompaniment in their assignments.

While these tools may enhance users' sense of interpersonal connection within a course vis-à-vis providing more "face time" and opportunities to hear each other, receptivity to these tools may depend on students' preferences or needs. For example, some students may prefer or need text-based grading feedback that is displayed at once, is easy to return to, and permits copying and pasting into a document for use at a later time.

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## COURSE ANALYTICS

One final useful LMS feature to note is how faculty can see some concrete markers of students' engagement in class. As mentioned earlier, both faculty and students leave digital footprints in the course. More specifically, faculty may be able to see when students last logged on, on what pages they spent time, how many times they visit specific pages in the course, and which pages they visit minimally, if at all. This data is tracked automatically within many LMSs and may be available through specific reporting functions of a given system.

Reviewing these analytics provides helpful information to teaching faculty and program administration. For example, there are multiple ways students enter and move through the LMS. Some students may go to the home screen of the course and open a tab specific to a certain type of assignment, such as discussions. They will look for the discussion due that week and proceed to work on the assignment. Other students may look at the entirety of a weekly module, starting with the overview screen, which orients them to the topic and learning goals, and then they progress methodically through each subsequent screen. Whatever path is chosen, faculty can see where individual students go and how often they are engaging in the course. For example, do students log on frequently and participate consistently across the week, or is their activity mostly at the last minute? Upon reviewing such data, faculty may see relationships between specific students' behavior in the course and their course progress (e.g., grades), prompting the provision of additional feedback and guidance (Clay, 2014). Course analytic data also may be used to assess the utility, placement, or presentation of information on infrequently visited portions of the course, or to run an analysis on quiz items most frequently answered correctly and incorrectly. Lastly, some LMSs have tools that can look for behavioral patterns, such as students who have not logged onto the course in a certain number of days, and a message or email can be sent automatically to prompt their return to class.

While helpful, some of this data should be interpreted cautiously. Some LMSs, for example, track the number of minutes a student was logged onto the system. In a given week, one student may have spent 180 minutes in the course, whereas another spent 1,200. These totals are not synonymous with meaningful engagement in the course,

however. The first student may have accessed the LMS, downloaded specific course materials, logged out, drafted her assignments, and logged on again to post her work at a later time; the second student may have logged on multiple times on multiple days, but was idle within the course for various reasons, such as surfing the web in another browser window during some of this time.

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## PROGRAM MANAGEMENT & DEVELOPMENT

The visibility of student and faculty presence and behavior in LMS-delivered courses is amenable to ongoing observation and assessment by program administration and other institutional personnel (Zen-Chen, Lowenthal, Bauer, Heaps, & Nielsen, 2017; Clay, 2014). Most programs delivering some or all of their coursework online establish expectations for faculty teaching those classes. For example, these teaching expectations may include the frequency with which faculty logon to the course; how many weekly, personalized contacts they have with each student; and, the turnaround time for grading assignments, all of which are time-stamped within the course. Program administrators overseeing the teaching of these courses may use this data as part of supportive feedback on teaching presence and style. In the discussion forums, for example, a faculty member could encourage more interaction among students or provide end-of-week summary posts highlighting key themes and how these relate to learning objectives.

This data also should be considered in light of other important teaching behaviors. For example, quickly returning graded assignments in line with programmatic expectations for turnaround is not the same as providing students with clear, detailed feedback about strengths and areas on which to focus in future assignments. Similarly, requiring faculty to have a high number of weekly, individualized contacts with each student does not assure the student experiences that contact as meaningful, productive, or supportive. A balance between timely and meaningful feedback and contact should be reflected in these program-level teaching expectations.

Lastly, many LMSs permit seamless integration of software to assess student learning. Again, embedding this within the LMS provides a single, centralized location for all users. Students will submit their assignments for grading as usual within the LMS, and faculty can grade them alongside completing programmatic rubrics to assess each student's attainment of program learning outcomes or other measurements.

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## CHALLENGES AND RECOMMENDATIONS FOR LMS USERS

Use of any technology requires first learning about it, and the same is true with LMSs: Faculty and students must learn how to use a LMS before effectively teaching through and learning within it, respectively. With increased exposure, users understand how the LMS impacts their learning or teaching processes and whether it is, in fact, a good fit for them. What follows is a brief overview of some of the challenges students and faculty may encounter, as well as some recommendations for all LMS users.

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## TECHNOLOGY REQUIREMENTS

Whether web-facilitated, hybrid, or fully online, all courses should clearly state the basic computer specifications needed to use the LMS, and the browsers and versions thereof supported by the LMS. At minimum, both faculty and students need: Consistent access to a reliable Internet connection, which could be problematic in some rural and international locations and during specific times of the year for those living in locations subject to serious and unpredictable weather, such as hurricanes; a computer with up-to-date software; and, two or more installed

browsers to troubleshoot any difficulties accessing the LMS. Users also need a backup plan should primary computers or Internet connections fail, and they should look for and complete software updates when available.

Students and faculty also need information about how (e.g., by phone or email) and who to contact when confronted with IT difficulties (Quality Matters, 2014; APA, 2013; Merisotis & Harvey, 2000). In some instances, they will contact their institutional IT department (e.g., unable to login to institutional email), whereas other concerns should be directed to the LMS's helpdesk (e.g., unable to see assignment feedback). Knowing how and when to make this distinction is essential.

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## CHALLENGES STUDENTS MAY ENCOUNTER

When taking FTF classes, the physical campus, fellow students, faculty and the like provide concrete cues class is in session, students are in the learner role, and help is available. Courses delivered in a blended or fully online format place significant responsibility on students' shoulders to be: Excellent managers of their time; self-starting; and proactive in identifying when they need help. Students should be encouraged to consider their course calendars in light of employment and personal ones, and to identify specific blocks of time on multiple days each week to devote to course activities and requirements (Newhouse & Cerniak, 2015). Classrooms are filled with non-traditional students who are trying to learn while fulfilling employment, familial, and other role expectations. In many ways, it is unsurprising why DE students become overwhelmed and have difficulty persisting or excelling in their classes (Hart, 2012). However, Romero and Barberà (2011) found greater time flexibility, meaning having multiple times each day to engage in online course activities, correlated positively with successful completion of assignments. Identifying a sufficient number of times each week may provide needed flexibility should an unexpected issue arise, and protecting these times may help students maintain a predictable and organized approach to their DE coursework.

As mentioned earlier, asynchronous DE classes may be populated with students located around the world. Because students and faculty are not participating simultaneously in class, it is important for faculty to clearly state the time zone within which they work, when they will be on and offline, and how quickly they will respond to emails or messages from students (e.g., within 24 hours). Doing so helps to create a frame and rhythm for the course and offers some predictability about the asynchronous contact common to many LMS courses. It is helpful to know where students live as well, especially when synchronous contact is required in a course or when scheduling telephone or video-conferencing appointments with students requesting such contact. Lastly, clarifying the time zone within which assignment deadlines occur is crucial for all users.

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## LEARNING TO TEACH ONLINE

One common misperception of teaching online is that which "works" in FTF classrooms translates readily to the virtual classroom (Haughton & Romero, 2009; Martin, 2009). As technology evolves so does its place in education, thus, requiring psychology faculty to stay abreast of technological innovation, how it impacts student learning, and how it informs teaching style. A significant body of research concerning best practices in online teaching (The Hanover Research Council, 2009; Merisotis & Harvey, 2000), DE education and learning styles (Aragon et al., 2002; Eom et al., 2006; Harrell & Bower, 2011; Perez Cereijo, 2006; Wang & Newlin, 2000), e-learning readiness (Chen, Lambert, & Guidry, 2010; Lorenzetti, 2005; Welsh, 2007), factors contributing to students' successful completion of online psychology courses and programs (Newhouse & Cerniak, 2015; Waschull, 2005; Waschull, 2001), and students' preferences for specific learning contexts (Clinefelter & Aslanian, 2016; EDUCAUSE, 2016), among others,



is available. While much of this research is focused on undergraduate populations and is not specific to the study and teaching of psychology, important insights can be gleaned. This is especially true as innovation within and improvements to LMSs occur, including the integration of artificial intelligence, simulation, and virtual reality, thus, prompting faculty to not only keep an eye on what already exists in DE but what is to come, too.

In addition to institutions providing faculty with initial and ongoing instruction in online teaching and use of the institution's chosen LMS (APA, 2013), faculty interested in or required to teach online should look to this literature for guidance at the outset and throughout their online teaching endeavors. To facilitate the development of an engaging and effective teaching style informed by existing LMSs and other technology, Table 1 provides a list of preliminary questions psychology faculty may ask of others more familiar or experienced with DE and the use of LMSs.

**Table 1: Questions for Psychology Faculty Developing a DE/Hybrid Teaching Style**

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- 1) In terms of teaching style, what similarities and differences have you observed when teaching psychology in a FTF vs. hybrid vs. DE context?
- 2) What psychology content have you taught in a DE or hybrid setting and what was that like?
- 3) What psychology content seems most or least suited to DE or hybrid contexts and why?
- 4) What features of this institution's chosen LMS are most/least helpful and why?
- 5) How do you provide feedback to DE or hybrid students?
- 6) Are students required to have synchronous contact in your course(s)? How do you schedule and manage that?
- 7) How have you addressed instances of plagiarism or fabrication in DE or hybrid settings?
- 8) How and when do you facilitate your DE or hybrid courses during the week?
- 9) Do you have any suggestions about how to interact with and/or demonstrate teaching presence to students located around the world? Are there additional cultural issues to consider when teaching online international students?
- 10) What is your late work policy and how did you determine that?

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#### PROVIDING FEEDBACK TO STUDENTS

Courses characterized in degree or in their entirety by asynchronous interaction warrant special consideration of how to deliver assignment feedback to online learners (Pyke & Sherlock, 2010). In a FTF course in which a specific student is struggling, a professor may provide extensive written feedback, complete with red ink, but discuss it in-person before sending it home with the student. Doing so may soften the receipt of constructive feedback while affording the student an opportunity to receive additional guidance and support to improve. In online courses, faculty need to be more deliberate in creating these opportunities. Of course, a DE professor could request the student arrange a synchronous meeting before releasing the feedback within the LMS; or, she may post the feedback first and suggest subsequent one-on-one contact. Either way, faculty using a LMS to deliver grades should give thought to how constructive feedback is phrased. This is especially true for asynchronous, DE faculty-student relationships which develop from afar: the ability to draw on verbal and nonverbal cues, such as vocal intonation

and facial expression, may facilitate students' receptivity to constructive feedback and their willingness to seek future assistance.

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## COURSE POLICIES

Progression through a course, completion of its assignments, and related academic policies are determined with purpose by faculty and program administration, and related expectations for class participation and assignment submissions should be expected and understood by all students. Non-traditional students, however, may face a wider range of possible disruptions to their studies or experience more events-turned-obstacles to their ability to study than traditional students (e.g., transnational or international travel required by one's employer, a dependent child's or older relative's illness). Course policies regarding late work, for example, should be clear, discussed at the outset of the term, and include some reasonable provision for extenuating circumstances impeding students' timely engagement in class or completion of assignments.

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## CONCLUSION

Technology has a clear role in 21st century postsecondary education, and its place in the teaching and learning of psychology evolves. LMSs and other web-based services provide programs and faculty with a range of features and tools to support synchronous and asynchronous interaction, academic integrity, writing support, the provision of feedback to students, and the development of a teaching style informed by technological innovation. To further support psychology faculty's learning about and adoption of technological tools, significantly more research is needed about how faculty uses technology, including LMSs, in the teaching of specific psychology content areas. Discussions about and related research exploring which psychology content areas and related competencies are more or less suited to hybrid and DE education is needed as well.

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# STRATEGIES FOR PROMOTING STUDENT ENGAGEMENT IN SYNCHRONOUS DISTANCE LEARNING

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## INTRODUCTION: THE CHANGING CLASSROOM

In August of 1984, I walked into the first classroom that an American high school had designated as “mine.” In addition to the standard student desks, built-in book shelves, and cabinets in the room, there were specific items designated as mine to use for instructional purposes. These items were likely familiar to every teacher at that time: A steel desk with a Formica surface, a manual typewriter, an overhead projector, a pull-down screen for projecting notes, films, filmstrips, and one box each of yellow and white chalk for the wall-length blackboard. Yes, it was black.

In August 2017, I began a new school year and walked into the “classroom” currently designated as “mine” at a small school in northern Minnesota. The equipment in this classroom includes: Two ceiling mounted projectors that project the desktop of my computer (and the work of students I choose to share with the class for discussion purposes), 40 individual computers on desks that form a sort of horseshoe around a centralized row of computer-less tables which represents our “home-base” for discussion and traditional lecture instruction, a mounted digital camera and microphone that allow me to visually and conversationally interact with students from my home office in suburban Philadelphia, two Wi-Fi hubs, and the school network.

The opportunity to teach from home in a manner that is almost exactly the way one teaches while in front of a traditional class in a brick and mortar school was something close to unimaginable in 1984. Today, the online education setting is not only possible but increasingly common. Powerful communication technology tools are ubiquitous to the point of permeating our social and professional lives and are accessed on a daily basis by people of all ages. These same tools allow teachers to deliver real-time lectures, discussions, assignments, assessments, and the typical classroom banter that elevates engagement and enthusiasm for a class and its content. Incorporating these tools into an online-learning environment does, however, come with some risk that requires deliberate and persistent attention. There is an intuitive assumption that an online education scenario raises the level student autonomy and responsibility necessary for successful learning of content. This is true to a point and we must recognize that there are two sides to this assumption. First, there is an assumed requirement that students must possess advanced skills in autonomy and self-direction *before* enrolling in an online course. This assumption often leads to directing students away from online courses because they are considered to be, or labeled as, lacking fundamental skills necessary for success in an online setting. Second is the assumed inability of teachers to design courses and *interact* with students in ways that deliberately nurture an adjusted approach to learning in an

environment that essentially mirrors the prevailing ways in which our society communicates, accesses, and acquires information.

For the past three years, I have taught high school courses online in a real-time distance learning scenario. The real-time interaction between a teacher and students who are in different physical locations is known as *Synchronous Distance Learning*. This chapter will offer suggestions in how the strategic use of technology tools can promote the development of skills that will allow students to successfully function with greater independent direction in an online educational setting.

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## THE BASICS OF TEACHING PSYCHOLOGY ONLINE: ESSENTIAL COMPONENTS

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### LEARNING MANAGEMENT SYSTEMS

From a teaching perspective, the LMS provides the starting point for student entry to, and ongoing participation in, an online course. Schools and school districts will usually adopt a LMS so teachers typically do not need to worry about comparison and selection. It is, however, important that teachers explore, assess, and become comfortable with all the tools and options that their particular LMS provides. The vision of what most fully meets the needs of the students in an effective and efficient manner is the lens through which LMS tools should be evaluated. All of us are likely to define these terms differently, but understand that the LMS provides the constant online location for dissemination of course material, scheduling assignments, and assessments. It is the digital “home” for quick and meaningful information.

There are many LMS options but they all provide a similar menu of course services and features. The following features are the most important:

1. Home page for posting essential course information. When students log in, this is the location of all they need to know in order understand what is happening in the course on a day-to-day basis.
2. Easily accessed and operated by teachers, students, and parents. Most learning management systems work efficiently and effectively. Most also require time for teachers to become familiar with using the LMS features most beneficial to their course goals.
3. Course calendar that clearly shows what is expected each day.
4. One-click access to course activities such as assignments, assessments, resources, forums, blogs, announcements, discussions, etc.
5. Grade book that allows for linkage between the LMS and the grading system used by the school or district. A well-organized LMS grade book makes the manual transfer of grades into school system less time consuming.
6. Test bank/question bank that can be built and quickly edited to allow efficient creation of assessments. Packaged test banks accompanying text books often need to be substantially supplemented by teacher created questions. The LMS should feature an uncomplicated process of writing, editing, and storing questions.

The big picture objective with the LMS is for teachers to become talented in using it as a deliberate vehicle for growing student engagement and adaptation to learning online. Remember the goal is to make the daily login attention-getting, engaging, and useful through easy accessibility to resources and clear directions.

Figure 1.1 shows the announcements forum of last years' General Psychology course. This image shows the **teacher view** of the page. Notice that this view includes the option to edit content. By clicking on the "Edit" menu for each item, teachers can easily alter or delete their previous postings. Teachers add materials in the "Add a Resource" or "Add an Activity" menus. Examples include announcements, webpage links, quizzes, discussion forums, wikis, chats, and more.

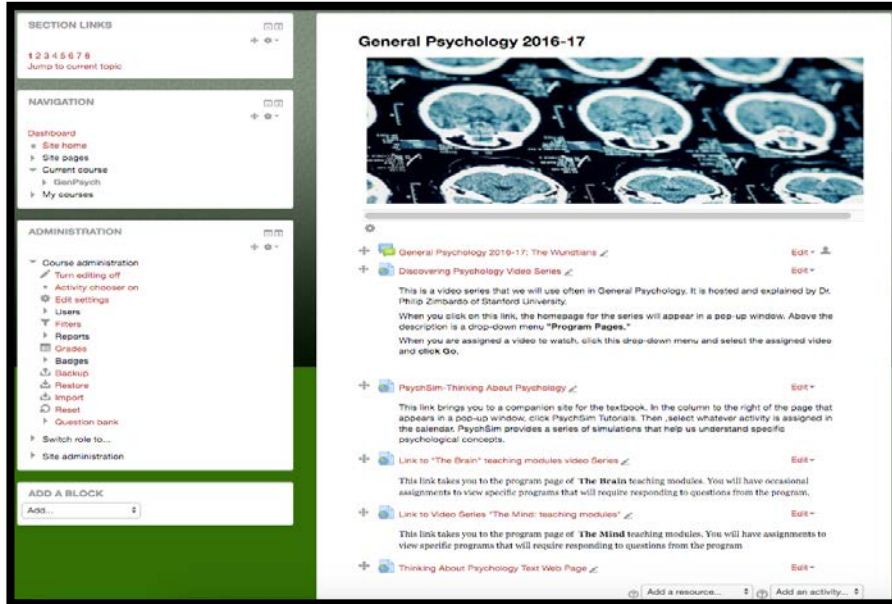


Figure 1.1

Figure 1.2 shows the same General Psychology course as figure 1.1. The difference is that this image shows the **student view** of the forum at the top of the home page. The student page lacks the Edit, Add a Resource, and Add an Activity menus. Students click on the red links to access resources.

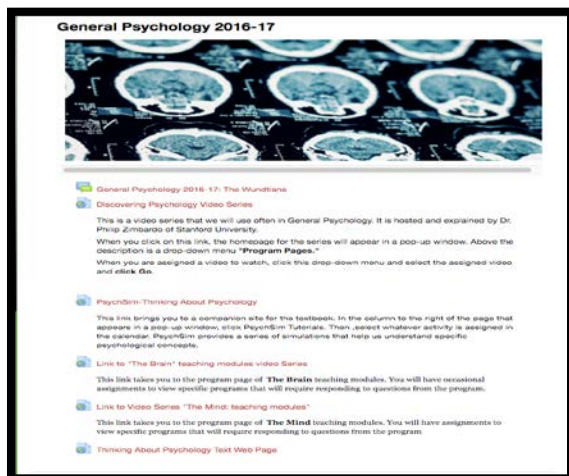


Figure 1.2



Figure 1.3 shows one way in which a typical content unit can be designed in a Moodle course. Other learning management systems have similar layout options. This image shows the first four days of the biopsychology unit. It provides quick and easy access to the daily agenda and daily activities. I use Google Docs to create a table in which I enter the day-to-day calendar of activities. I copy each unit portion of that calendar and paste it into the unit on the LMS. Items in red are links to the specific assignment or assessment.

Unit 2: BioPsychology-The Nervous System and Brain Modules 4-5		
Date: September	Unit 2: BioPsychology-The Nervous System and Brain Modules 4-5	Reading Assignments
21	<p><b>Module 4: The Nervous System the Endocrine System</b></p> <p>1) Starter: <a href="#">Identify the basic structures of neurons.</a></p> <p>2) Discussion/Lecture: Biopsychology and Neurons</p> <p>3) Assignment: <a href="#">#1 PsychSim Neural Messaging (Classroom, Unit 2)</a></p> <p>4) Tonight: Read "Neurons: The Building Blocks of the Nervous System, How Neurons Communicate"</p>	p. 61-70
22	<p>1) Starter: <a href="#">Explain Resting and Action Potentials, Absolute and Relative Refractory Periods.</a></p> <p>2) <a href="#">Quiz 1, Neurons</a></p> <p>3) Discussion/Lecture: Electrochemical Process of Neural Communication</p> <p>3) Assignment: <a href="#">#2 Discovering Psychology: The Behaving Brain (Classroom, Unit 2)</a></p> <p>4) Tonight: Complete and Submit Assignment #2 No reading assignment tonight</p>	
23	<p>1) Starter: <a href="#">Explain the different effects of excitatory and inhibitory neurotransmitters.</a></p> <p>2) Discussion/Lecture: Neural Transmission, Organization of the Nervous System</p> <p>3) Assignment: <a href="#">#3 Close Reading and Categorization p. 70-72: Structure of the Nervous System (Classroom, Unit 2)</a></p> <p>4) Tonight: Complete and Submit Assignment #3</p>	
Weekend	Study Module 4, p. 61-70	
26	<p>1) Starter: <a href="#">Identify the divisions of the nervous system and briefly explain the functions of each division.</a></p> <p>2) <a href="#">Quiz Neurons and Neural Transmission</a></p> <p>3) Discussion/Lecture: Nervous and Endocrine Systems System</p> <p>3) Assignment: <a href="#">#4 Close Reading and Categorization p. 73-74: Structure of the Nervous System (Classroom, Unit 2)</a></p> <p>4) Tonight: Complete and Submit Assignment #4</p>	

Figure 1.3:

## USING THE LMS AS A TOOL FOR STUDENT ENGAGEMENT

As the LMS is the starting point for an online course, it must be considered in the context of goals we wish to achieve. Our student engagement and growth of skills translate to the use of the LMS in the following ways. First, it is the digital point at which we grab the attention of our students. Second, it should stimulate interest in the course. Third, it should conjure a sense of urgency regarding the course and completion of learning and assessment activities.

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## ATTENTIONAL STRATEGIES

View the LMS in the same way you view your brick and mortar classroom. Most teachers recognize that when students physically walk into a classroom it is important that they are cued to mentally transition from the less formal setting and expectations of the hallway to the more formal academic setting and its elevated expectations. When students enter the online course by logging in to the LMS each day, they benefit from same type of cue that will signal that they should shift their focus and cognition toward engaged academic thinking. There are many ways to provide this. For example, starter activities that appear with instructions when a student enters the class home page on the LMS are an excellent way to stimulate their cognitive presence. Keep in mind that starter activities should last only 5 or 10 minutes and in addition to functioning as an attention-getter, they should also as review of, or transitions from previous learning, or as foundations from which to move into new content material.

The following are effective and fairly easy examples of starter activities designed to shift student attention to mindset of more focused academic thinking.

- **Visual sources** with a specific question that require short written responses that involve student application of previous learning, or speculation regarding content that will be presented later in the class period. Types of visual stimuli that can be effectively used as starters in a psychology course are virtually limitless. I have used brain images, CAT scans, MRI and fMRI images, bobo doll video clips, Skinner boxes, optical illusions, mazes, graphs, Little Albert video clips, etc.
- **Short text excerpts** (not longer than a paragraph) can be used as a stimulus to a question prompt to which student write and submit a short response. Quotes from famous psychologists, research abstracts, patient transcripts, etc., have been used.
- **Short quizzes** (10 to 12 multiple choice questions) on previously learned material that is relevant to new material that will be covered, or current reading assignments, etc., also have been employed.

Whatever starter activity you create and use, design it to meet the goal of shifting the mindset of the student to an engaged academic mode. Also keep it shorter rather than longer. Our goal at the start of an online class is the same as the goal of a physical classroom, to prime students for learning and conjure focus that will be sustained with further class activities.

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## PROVIDING ORGANIZATION AND STRUCTURE TO ENHANCE ENGAGEMENT

Student confusion about what they are expected to do and when they are expected to do it leads to lost learning time. The LMS is the home of your course. Structure it to eliminate as much confusion as possible from the moment a student logs into the course. Create a day-to-day calendar that includes an agenda for each day. See *Figure 1.3* to see an example of how this might appear on the course home page. For assignments, provide clear timeframes and deadlines for every assignment and assessment.

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## STRATEGIES TO STIMULATE INTEREST AND URGENCY

Designing activities and presenting them with clear time expectations is an automatic signal that “this is important and needs to be done.” Practicing this consistently will help students define the class in like terms. When we provide the structured calendar with a daily sequence of events, that include clearly labeled assessments regularly woven into the course, we certainly reduce confusion and lost time. We also signal that course content is important because it will be regularly assessed. By infusing our home-page and course activities with ubiquitous signals that “this is important” we promote a positive shift in student perception toward a mindset aimed to increase engaged attention.

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## LOCATION FOR WRITTEN WORK: GOOGLE CLASSROOM

A more recent introduction to the online learning and teaching scenario is Google Classroom. The use of Google products in American education has grown substantially since Google Classroom was introduced in 2014. Google Classroom is one of eleven components that make up Google’s G Suite for Education and each of these components are valuable additions to any virtual classroom.

For most teachers, Google educational components arrive as part of the G Suite in which the school or district has enrolled. G Suite provides tools through which teachers and districts can organize assignments, track student performance, and initiate communication with parents, students, other teachers. The most apparent pieces of this integrated organizational system are Classroom, Gmail, Google Drive and its applications, and Google Calendar. All of these tools are immediately available to teachers when their school or district subscribes to G Suite.

For teachers, Classroom is instantly usable and productive. A clear and direct tutorial provided with the first login makes it easy to create a course. Navigating this straight-to-the-point tutorial takes only a few minutes but enables one to move directly into creating classes into which students enroll using an access code. Once students enroll, they receive announcements and assignments posted by the teacher. They complete and submit these assignments entirely online. Teachers score and “return” the assignments completely online also. While scoring student work, teachers can directly edit the student document, add commentary, or post private remarks regarding the assignment if they choose.

The process of assigning course work in Google Classroom is achieved in a variety of ways. One common approach is to create a Google Docs assignment in Google Drive. In Classroom, select “Create assignment” and insert the assignment document from Google Drive. Teachers have options regarding how the assignment is presented and how the assignment is completed. Selecting “Make a copy for each student” means that a personal copy of the assignment will be available for each student. This is the digital version of making a paper copy of an assignment and distributing it to individual students in class. The student then completes the assignment individually without collaboration. Another assignment option is to use an assignment you create, and insert into the Classroom page. Select “Students can edit” as a way to encourage collaboration because all students are editing the same document.

Figures 1.4, 1.5, and 1.6 provide examples of Google Classroom assignments. Figure 1.4 shows an assignment posted in Google Classroom.

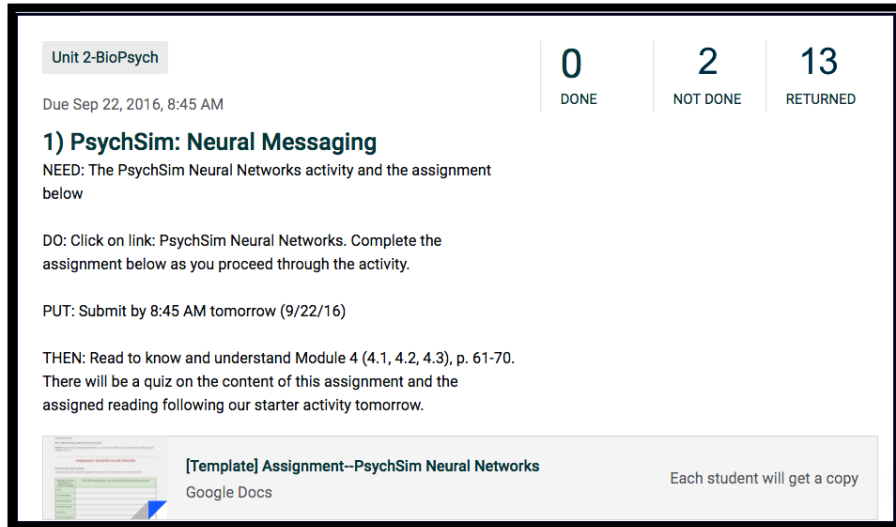


Figure 1.4

The assignment includes a link to an online activity and a study guide that goes with it. This assignment followed an introductory discussion on biopsychology and a description of neurons and their functioning. Notice that each student has their own copy of this assignment. This means that they will complete it and submit it individually. Figure 1.5 is a document as it would appear to students when they open an assignment. This is also an assignment in which each student receives their own copy to complete and submit individually.

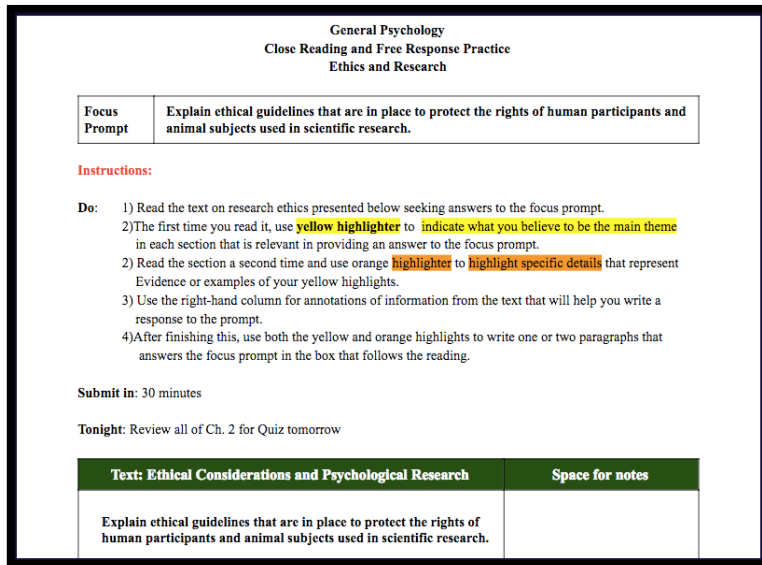


Figure 1.5

Figure 1.6 is an assignment in the “Students can edit file” mode. This allows all students to enter comments and edits to a single document. On this assignment, the next day in class I added a column for rating the strength of evidence (0 = No Relevant Evidence, 1 = Weak Evidence, 2 = Adequate Evidence, 3 = Strong Evidence) in support of the position

expressed by the student in the row below. After the ratings were entered and we discussed the qualities of research-based evidence students edited their responses.

**General Psychology**  
Forum Posting: About Behaviorism  
(10 pts)

DO:

- 1) Use "close-reading" assignment (#5 Excerpt from *About Behaviorism* (1974)), and the reading assignment last night (p. 282-285) as sources.
- 2) Write a brief response that explains ONE specific reason why the claim made by B.F. Skinner was correct or incorrect. Your response must provide at least one specific piece of relevant evidence to support your position.
- 3) Write your response in your assigned row of the table below.

Submit: Complete by 9:55 in class today

THEN:

- 1) Engage in the lecture/discussion "Observational Learning"
- 2) Tonight Read Module 15, p. 289-293

**B.F. Skinner claimed that "the major problems of the world can be solved only if we improve our understanding of human behavior."**

**Was Skinner correct that operant conditioning is an important way to understand and improve human behavior?**

Student	Brief response that explains ONE specific reason why the claim made by B.F. Skinner was correct or incorrect. Your response must provide at least one specific piece of relevant evidence to support your position.
Student A	
Student B	
Student C	

Figure 1.6

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## USING GOOGLE CLASSROOM AS A TOOL FOR STUDENT ENGAGEMENT

As with the LMS, we need to consider goals beyond simply transmitting course content. If we accept the idea that the LMS is the attention grabbing starting point that encourages students to mentally shift into learning mode, we must also realize that the activities assigned and worked on in Google Classroom (and other platforms) must maintain, rather than detract from, the focus and mental activity gained with the starter in the LMS. In my classes, I follow a sequence in which I try to keep students engaged, active, and focused on content goals while also supporting their sense of "this is important" and personal responsibility to know and understand. This sequence, even with its variations, is reflected in the day-to-day schedule shown in *Figure 1.3*. It allows students to become familiar with the pace and approach I expect and the manner in which we use our time during class. It also establishes a routine that requires less explaining of "What are we supposed to do?" so that I can spend more time teaching and discussing content and students can spend more time learning and applying it. Designing assignments for use in class, and also as homework, for an online class always requires tending to the goal of maintaining enthused engagement while also promoting content acquisition. The reality of online teaching is that students and teachers are in two different physical locations and this distance can inhibit the sense of connection in the academic relationship between teacher and student. One way to work against the potential disconnect is to use our technology tools to create an active class culture by thoughtfully scheduling class time in ways that engage the student in activities that are inherently valuable, but also because they are scored and part of the course grade.

Table 1.1 shows the variations of the common sequence I employ my online classes. Classes are 70 minutes long and start with me using Google Meet to take attendance and quickly explain the starter.

Table 1.1

<b>Starter</b>	5-10 minutes	Visual sources, text excerpts, short quizzes	Moodle
<b>New content options</b>	30-35 minutes	Direct Instruction (lecture/discussion)	Google Meet
		Multiple Choice Quiz	Moodle
		Collaborative/Group assignment that requires more time	Classroom
		Forum discussion	Moodle or Classroom
<b>Content application or assessment</b>	25-30 minutes	Assignment requiring application of lecture/discussion or reading topic/s	Classroom
		Quiz	Moodle

Students adapt to this routine rather quickly and become more productive, more engaged, and more interested over time. When I started teaching online in 2014, I commonly filled class time with lectures or assignments that took too much time for students to maintain focus and enthusiasm waned. One of the most important qualities of this structure is that even when I am not lecturing/discussing, I can directly interact on a one-to-one basis with any student at any time. In both Moodle and Google Classroom teachers can “pop-in” on student work and offer suggestions and comments. For example, often when students are taking a quiz on Moodle, I will check in on their quizzes as they answer questions. As they progress through a quiz, they are instructed to “flag” questions they find confusing. When I check their quizzes as they work, I click the flagged questions and offer advice or clarification.

When they are working on an assignment in Google Classroom, I click on student documents to monitor progress, make recommendations, and add comments or encouragement. Often I will ask a student if I can anonymously share their work with the class because it represents an exemplary response. When they consent, I copy and paste the exemplary response in a document on my computer, share my screen with the class, and explain how the sample is

a perfect way to approach the question, prompt, or assignment. This always produces responses such as: “Oh, now I get it. Thanks.” Or “Wow, that’s great. Whose is it?”

Remember, one of our main goals is to generate and maintain engagement and enthusiasm for our course while not being physically present. Pop-ins like these help students understand that you care about their work and are helpful and accessible.

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## WEBEX AND GOOGLE MEET

*Synchronous Distance Learning* courses operate with real time class meetings through which students and teacher interact through video conferencing. The teacher instructs students directly during a specified, synchronous, class period in which students and teacher are in different physical locations. This is my experience with online teaching. I meet every day with students, who attend a “brick and mortar” school a thousand miles away, from my home office. My students are scheduled into the computer lab setting that was described briefly above. From my office, I join the class via video conferencing in which students see me, and any props I choose to introduce such as brain models, eye models, for example. The computer lab camera is positioned to allow me to view the entire class and the microphone allows me to clearly hear questions, comments, and responses to my direct questioning, and discussion activity.

Video conferencing ability is an area of ever-evolving options that are increasingly cost-effective as prices range from free to around \$30 a month. I am currently using the Google Meet application available through G Suite for Education. In various capacities, I have also used WebEx, Skype, and Big Blue Button. Google Meet provides the essential features of video conferencing and there is currently no fee for its use because it is a component of the G Suite for Education package. The synchronous format of my courses requires only one AV link for a video conference. The configuration of the classroom allows me to directly link my computer, camera, microphone, and computer desktop to a single computer in the classroom. That computer projects my visuals (me and my computer screen) onto to the two screens located so that students can see what I am presenting from wherever they are sitting. My voice is transmitted through speakers connected to that computer. I hear students through a strategically placed microphone and see them through the camera connected to the computer.

The audio and video aspect of teaching via a video conference is only one important consideration. Equally important is the ability to share your computer desktop because this is our visual explanation platform, just as blackboards, whiteboards, or projectors are in traditional classes. Screen sharing means you share whatever is on the desktop of your computer. In all of the video conferencing tools I have used, it is a one click “button” that causes your screen to be shared with others in your conference (also referred to as meeting). When I share my desktop, my computer screen is projected onto the screens in our classroom. Anything on your screen is shared and for teaching purposes, presentations, digital white boards, documents, webpages, etc. can be shared with smart boards, projectors, or groups of computers through the video conference. When sharing information with a class, I find it essential to be able to annotate as I present. I have used the various presentation applications for imagery and text lectures and this works quite well in explaining content.

An option I now use daily is a digital pen and MS OneNote. The digital pen allows me to write on my screen as though I were writing on a whiteboard and OneNote serves as the canvas on which I can write. Figure 1.7 shows an example of how digital whiteboards can be used while screen sharing. Users can import text, images, PDF documents, and presentations as foundations over which annotations are added. The image shows a text outline created in Google

Docs that was copied and pasted into a page in OneNote. I added a screen shot of a blank neuron from a series of multiple choice questions. I removed letter labels from the screen shot and pasted it on the same page as the outline. In class, rather than me simply describing neurons, I directly call on specific students asking for their explanation or labeling, etc. The result is a more participatory environment which serves the goal of nurturing active student engagement. The annotations are student responses and correctly labeled structures.

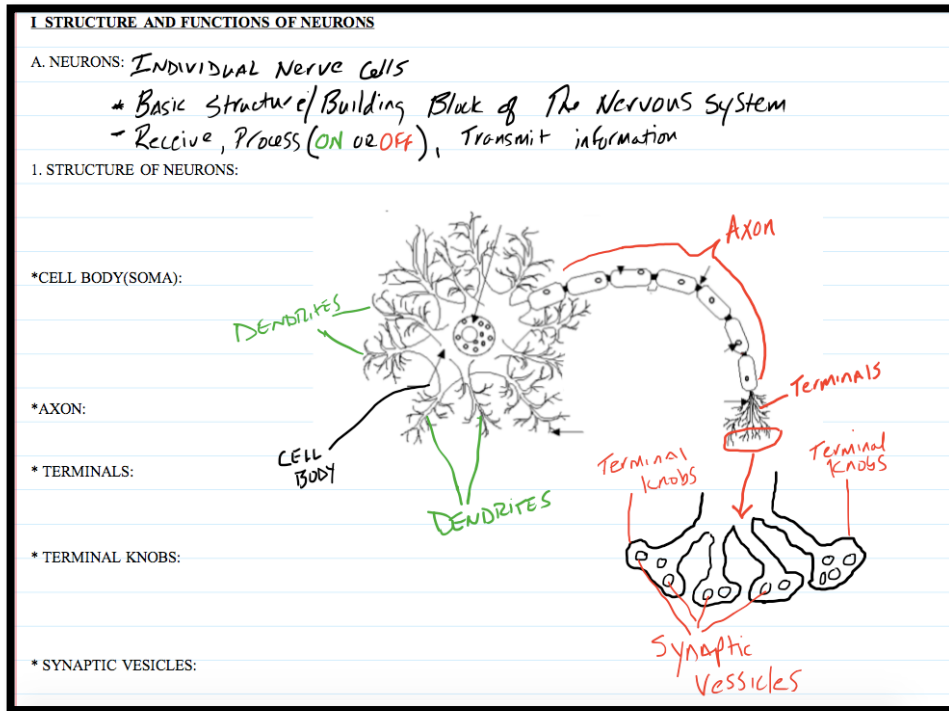


Figure 1.7

## CONCLUSION

By deliberately applying strategies while using readily available technology, teachers can influence students to higher levels of engaged learning and acceptance of personal responsibility in well-structured online educational settings.



OER: A PATHWAY TO ENHANCE  
STUDENT ACCESS AND  
MOTIVATION**ANTON O. TOLMAN AND SETH GURELL** UTAH VALLEY UNIVERSITY

## INTRODUCTION

In what is perhaps the most famous of presidential speeches to the American Psychological Association, George Miller in September 1969 challenged the field to rethink how it could contribute to human welfare (Miller, 1969). The core theme of his remarks was that “Psychological facts should be passed out freely to all who need and can use them” (p. 1070). He further stated, “Our responsibility is less to assume the role of experts and try to apply psychology ourselves than to give it away to the people who really need it – and that includes everyone” (p. 1071).

Miller’s encouragement undoubtedly resonates with many psychologists teaching today in higher education who make sincere efforts to encourage the application of psychological principles in the lives of their students, but when it comes to openly sharing the remarkable findings of the field, the reality is that they are often anything but free. Allen and Seaman (2017) note in their survey of faculty that 68% required a textbook and 53% required articles or case studies. However, only a small percentage of courses were using some form of openly licensed content material such as those with a Creative Commons license or that come from the public domain (5% print textbooks and 11% digital textbooks). Such materials are usually referred to as OER, Open Educational Resources. The majority of faculty (90%) described the cost of textbooks and materials as an important or very important consideration in their courses, a fact in direct contrast to the small numbers of those using OER (see also Green, 2016). Clearly, faculty are worried about the cost of student textbooks, but many are not yet taking direct steps to reduce that cost. This represents an opportunity for improvement, not to mention reduction of professional cognitive dissonance.

This need for action is becoming more urgent. For example, Jhangiani and Jhangiani (2017) noted a 129% rise in the price of textbooks over 15 years in the United States; together with increases in college tuition, the long-standing goal of broadening access for all students to higher education is threatened. Although not specific to psychology, the Florida Virtual Campus (2016) conducted a survey of 22,000 student enrolled in Florida public institutions of higher education, concluding that “The financial burden that students must bear for textbooks and course materials – and its impact on their academic choices and success – is a mounting concern for Florida’s higher education community” (p.7). Among their key findings, they note that cost of textbooks significantly reduces student access to required materials (67% of students did not purchase a required text), influences grades, and increases time to graduation. They also reported: Students purchased fewer textbooks than noted in a 2012 study; students tried to lower costs by purchasing from sources other than the institution’s bookstore; almost half of students took fewer courses; and significant percentages of students used rented textbooks, either print or digital. Also, fewer students received financial aid and significant numbers of those who did noted that those funds did not cover textbook costs. A disturbing result reported by the Book Industry Study Group (2013) was that 34% of their sample reported that they or someone they knew had downloaded textbooks illegally.

Taken together, these reported trends paint a broad picture of students struggling with difficult decisions about the cost, and therefore the accessibility, of course materials. The impact of these decisions are still being evaluated, but given the primacy of commercial textbooks in higher education, it appears to be substantial. For many students, decisions about whether to continue their education, what to sacrifice, and alternate routes to access are all shaped by the cost of their textbook and course materials. Additionally, the stress generated by these decisions as well as delayed or lack of access to materials also impacts on how well they learn.

Concerns with student learning and performance lead many professors to describe quality as their primary consideration for course materials and presumably influences their expressed worries about the quality of OER materials, a concern that is unfounded. Empirical evidence indicates that OER materials are of equal or possibly even higher value to student performance than traditional commercial texts. For example, in a conference panel discussion (Hendricks, Jhangiani, & Madland, 2016), Jhangiani described a study involving the random assignment of a printed version of the OER OpenStax text, the online digital version of the same text, or a commonly used commercial text such as the David Myers text frequently used in introductory psychology courses. He found no significant differences on exam performance for the second and third exams between the text versions, but surprisingly, on the first exam, students using the commercial text performed significantly *worse* than students using the printed OER text. Jhangiani believes (personal communication) the students with the OER text performed better on the first exam due primarily to access: Students were able to use the text from the first day of the semester to study and learn because it was free, while students with the commercial text likely waited to purchase it until they believed it was critical or had the funds to do so, a pattern in student behavior that has been reported elsewhere (Florida Virtual Campus, 2016).

Jhangiani and Jhangiani (2017) also summarized the results of thirteen studies with more than 100,000 students, reporting that virtually all of the students achieved the same *or better* outcomes (including lower withdrawal and higher completion rates) when they used OER in their classes. They conclude that “the significant cost savings to students ... do not come at the cost of academic outcomes.” These findings support the quality of OER as a viable alternative to traditional commercial textbooks, at least for introductory psychology courses.

Some readers may ask why a chapter on OER is included in a book about technology in teaching psychology. Although OER texts can be ordered in print form, the reality is that most of them are downloadable as PDF files, often including embedded links to other digital materials such as TED Talks, YouTube videos, demonstrations, and other useful materials. Additionally, as online education becomes mainstream (Allen & Seaman, 2017) and faculty increase their use of institutional Learning Management Systems (LMS; see Cerniak’s chapter in this volume), the opportunity to integrate OER textbooks directly into digital resources already available to students is growing. This is certainly true in psychology. Two major sources of OER materials in introductory psychology, NOBA (<http://nobaproject.com>) and OpenStax (<https://openstax.org/details/books/psychology>), are digital texts accompanied by a suite of supplementary materials including quizzes, test banks, PowerPoint slides, and other materials. By exploring OER in this chapter, we also are encompassing the use of digital materials in psychology courses.

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## FACTORS INFLUENCING FACULTY DECISIONS ABOUT OER

In order to understand the factors that influence an instructor’s decisions regarding course materials, it is important to consider systemic factors including cultural, social, technical, programmatic, and pedagogical infrastructures within higher education. These factors can, at times, significantly influence what forms of OER might be considered viable for adoption. For example, if department policy mandates that all sections of a specific course, such as

introductory psychology, utilize the same text and core materials or adhere to a course structure imposed by either the institution's LMS or by agreements with publishers, this can shape and limit the options available to those seeking to adopt OER. On the other hand, some institutions are now beginning to create "Z degrees", complete degree programs built entirely on OER (Jhangiani & Jhangiani, 2017); if this trend continues, faculty teaching in these programs would adopt OER as a routine matter. Some institutions have financial "incentives," providing one-time stipends to faculty to adopt and adapt OER into their courses. All of these forces can have significant effects on faculty willingness to consider adopting OER and, over time, grow the pool of instructors who are doing so.

Research into the motivation of faculty to adopt OER is emerging as the use of OER increases. Martin et al. (2017) surveyed faculty at Brigham Young University about open textbooks in particular. The top response, by a significant margin, was to "save students money" with roughly three-quarters of respondents indicating it was a factor. The second most common response was the belief that OER was of equal quality with commercial offerings. Jhangiani et al. (2016), in a survey of faculty in the British Columbia system examined several "enabling factors" that motivated faculty to adopt OER. The top enabling factors were whether a resource was relevant, from a reputable producer, and easy to access. The authors also found that the perception of quality was influenced by awareness and familiarity. Faculty who had previously adopted OER rated the quality of OER materials significantly higher than those faculty who had not adopted OER.

Further research into factors shaping adoption suggest pragmatic considerations when considering OER. McKerlich, Ivies, and McGreal (2013) surveyed faculty at Athabasca University and found that faculty were most concerned about "academic quality" and the time needed to search for OER. This finding was supported by Allen and Seaman (2017) who noted that finding resources relevant to a faculty member was the biggest barrier to adopting OER. It certainly seems reasonable to conclude that faculty reluctance to adopt OER is also likely to be influenced by social and institutional culture considerations such as the degree of encouragement of OER adoption by faculty peers, department chairs, deans, and administrators as well as the degree to which the institution publicly links use of OER to outcomes such as access, retention, and student success, or even better, might be seen as validation of a professor's commitment to teaching in the tenure process.

Given available studies, it can be concluded that faculty are willing to adopt OER but are cautious of quality. Given the multiple demands on their time, faculty are understandably reluctant to engage in searches of OER repositories that vary widely in formats, features, and quality. This particular problem is relevant to psychology. Apart from NOBA and Openstax, mentioned above, which focus primarily on providing resources for introductory psychology, identifying OER materials for use in other courses in the psychology curriculum can be difficult and time-consuming. This is certainly an area ripe for development and improvement in the field, perhaps led by the Society for the Teaching of Psychology.

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## STUDENT REACTIONS TO OER COURSE MATERIALS

Most of the existing data regarding OER adoption is based on faculty surveys and perspectives, but it is also important to evaluate and hear students' perspectives on these issues; students are the ones directly using these materials, and if OER is to succeed, it must ultimately work for the students. As with research on faculty perceptions, student research is also nascent but growing. In a survey of eight community college institutions, Bliss et al. (2013) found that students enjoyed their OER textbooks though some of the features they enjoyed the most were related to the fact that the textbook was online (not specific only to OER). Hilton et al. (2013) examined student perception of OER across multiple math courses. Overall, students believed that the work materials met their needs. (See Sage's

chapter in this volume for a discussion of electronic textbooks). Cost savings, understandably, are popular with students. Lindshield and Adhikari (2013) found that both residential and online students appreciated free textbooks. Martin et al. (2017) found that many students self-reported reinvesting the money saved from free textbooks primarily into housing, food, and savings. Jhangiani and Jhangiani (2017) summarized multiple studies of student perceptions of OER and reported that a significant majority of students found OER “easy to use,” felt they were more current than commercial texts, and felt the quality of OER was equal or superior to commercial texts. This finding is apparently true for nations beyond the United States. In their own survey of Canadian students enrolled in higher education, Jhangiani and Jhangiani (2017) found that 63% rated their OER text to be of above average or excellent quality and only 3.5% of the sample rated it as below average or of poor quality. More than half of their respondents disagreed with the statement that they would have preferred to have purchased a traditional textbook.

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## A PERSONAL PERSPECTIVE

Every semester Anton Tolman (the first author) teaches a large online section of introductory psychology. Similar to other professors, Tolman has long been interested in reducing costs to students while still maintaining a high level of quality in the materials. He also was interested in customization – the ability to use a Creative Commons license to integrate his own content, experiences, and clarifications to the existing text, something that often happens naturally in face-to-face courses. After reviewing available materials, he selected the Openstax text. The psychology department had already been making attempts to lower costs to students, dropping textbook costs from approximately \$200 to the \$60-70 range, but Tolman was able to implement the OpenStax text in a way that was customizable using TopHat.com, an external software platform for \$8 per student. While this system was fairly new and worked well overall, it had several weak points, the largest being the external nature of the platform and lack of integration into the Canvas LMS system, a major aspect of online coursework. Many students expressed gratitude for the lowered cost and described enjoying the text as well as the professor’s perspective and additional comments.

After further discussion and exploration, Tolman and colleagues in the psychology department launched in Fall 2017 a modified version of the Openstax text using a new platform from Lumen Learning called Waymaker (<http://www.lumenlearning.com/what/waymaker/>). This version of the OER text was incorporated into almost all sections of the course, including online, hybrid, and face-to-face courses, with the plan for full implementation in the following semester. Waymaker is integrated into the Canvas LMS and although not as customizable as the TopHat version and somewhat more expensive (\$25 total), it is easily accessible by students with all embedded material displaying within the LMS; it also has features of formative assessment and mastery learning including self-checks and the opportunity to take quizzes more than once. Further, ancillary assignments were impressive in scope and the depth of application of course concepts to students’ lives. Another nice feature is that Waymaker provides automated messages to students to both recognize student success for those doing well and encouragement and suggestions for struggling students on how to improve their performance. It makes it simple for instructors to track struggling students in order to reach out to them and support them in their learning. Although this implementation is still early, multiple students have thanked Tolman for the new system, are responsive to the messages, and appreciate being able to access their text directly through Canvas. Discussions with other instructors in the department, some using the OER text and platform in face-to-face courses, demonstrated that faculty enthusiasm for the platform and the text is fairly high and that students’ reactions are quite positive, overall.

Although specific data is lacking, Tolman’s impression is that use of the integrated OER textbook and materials has at least resulted in a decreased withdrawal rate from his course. The fact that both students and faculty are generally positive in their impressions of the text and the Waymaker platform suggests that OER represents a valuable

pedagogical shift in introductory psychology courses in this department. This is especially true because prior to this implementation several of the instructors involved had no prior experience with OER and only decided to “buy in” to the program because of the groundwork and encouragement by Tolman and Dr. Jessica Hill, the lead instructor for introductory psychology.

Waymaker does provide customization options for the module quizzes, but at this point, customization and adaptation of the OpenStax text in the platform is not available, although professors can choose which modules to keep or hide and can delete or reorganize the text-based self-check, and ancillary materials. Tolman has opted to retain the customized materials he used previously in the TopHat course including notes, stories, explanations of concepts, and links to external public domain or OER materials through an editable document that is included in each course module.

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## THE FUTURE OF OER TEXTS AND OPEN EDUCATIONAL PRACTICE

As various faculty and institutions continue to adopt OER, there are increasing numbers of faculty with multiple semesters of experience in using OER in the classroom. Although these courses meet the laudable goals of saving money for students and giving them immediate access to the course on the first day of the semester, there remains additional untapped potential to OER. To better understand the possibilities of OER the permissions underlying it should be considered.

OER allows not just for the free adoption and dissemination of a resource as-is, but it also allows for modification such as that described by Tolman above. However, while some faculty may make minor modifications to a resource before use, reports indicate most do not put significant effort into editing materials (Hilton, Lutz, & Wiley, 2012). De Liddo (2010) suggests that one reason for this may be that instructors are not accustomed to thinking in terms of openness. Rao, Hilton, and Harper (2017), pointing to translation efforts of well-known OER projects, suggest that modification does occur but only if the project is sufficiently well-known and the modification is occurring on a large scale. These authors cite MIT OpenCourseWare, which is been translated into several different languages, as an example. Mtebe and Raisamo (2014), in their interviews with instructors in Africa, found that barriers to adoption ranged from infrastructure to lack of interest. Cannell, Page, and Macintyre (2016) note in the United Kingdom that as OER adoption increases and relationships are built between institutions and supportive organizations, opportunities to remix begin to emerge. For example, the Open University, which has expertise in publishing OER, collaborated with Scottish scholars to produce OER in the Gaelic language. Jhangiani et al. (2016) reported some instructor concerns about support in adapting an OER. Although the details vary, the research regarding remixing of open educational resources shows common themes of lack of support (technology, policy, or resource allocation) and instructor confidence as some of the primary barriers.

Over time, theorists and practitioners have begun to explore the concept of “open” beyond the boundaries of textbooks or other materials; these explorations center around how to promote student learning outcomes by being open with respect to course content and the instructor’s pedagogy. This field of research is known as Open Educational Practice (OEP). Glennie et al. (2012) cite the International Council for Open and Distance Education (ICDE) definition of OEP as “practices which support the production, use and reuse of high quality open educational resources (OER) through institutional policies, which promote innovative pedagogical models, and respect and empower learners as co-producers on their lifelong learning path” (p. 112-113). Many OEP elements such as self-directed learning, differentiated learning pathways, collaboration and sharing, already will be familiar to faculty and staff promoting advanced pedagogy. Ehlers (2011) categorizes open educational practices into “high,” “medium,”

and “low” levels of implementation with highest form of open educational practice including both open course objectives and methods.

Robin DeRosa teaches American Literature at Plymouth State University and wanted to reduce costs to students. However, rather than simply selecting freely available sources and presenting them to the class, DeRosa involved students in the process. They were asked to find resources and modify them as necessary to become part of the planned anthology that would become her course textbook. As part of their work on the anthology, students posted their thoughts on social media, making the process participatory across boundaries (DeRosa & Robinson, 2017). Additionally, Tolman and Lee (2013) described approaches to integrate student decision-making and participation in the classroom that include course design, assignment options, and course policies. DeRosa and Robinson (2017) noted that The Noba Project holds a contest for student-created videos related to psychology concepts that are posted on the site and can be accessed by other faculty to use.

Examples of OEP can extend beyond interactions with students. Strohmetz, Ciarocco, and Lewandowski (2017) discussed the creation of TeachPsychScience.org, which is a website dedicated to freely sharing resources for teaching statistics and research methods in psychology. Harnett (2017) described sharing psychology resources on a blog as part of a natural evolution of her practice. In both of these instances teachers in the field are opening their practice and describe the process as being mutually beneficial to them individually and to the field generally.

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## CONCLUSIONS

In 1969, George Miller challenged psychologists to “give psychology away” for the benefit of society. Given the current costs of textbooks, one of the best ways to get the findings of this remarkable field into the minds of as many people as possible is by making OER widely available to students in psychology courses, especially introductory psychology. Absent OER adoption, there is evidence to suggest serious and growing negative impact on students’ abilities to learn, remain in higher education, and graduate.

The progress of OER in psychology by that measure is promising. The foundational work of NOBA and OpenStax, along with the personal experience by one of the authors, has demonstrated that widespread adoption of OER in a department is achievable with persistence and support. Further effort is needed to promote the creation of open texts in other key courses in the psychology curriculum. In particular, creation of OER texts in abnormal psychology, development, statistics, research methods, and neuroscience would be beneficial. Laudable efforts through websites such as teachpsychscience.org shows the field beginning to respond to these needs, but continued expansion is vital.

The major factors that appear to influence the faculty decision to adopt OER includes a desire to reduce student cost and the growing evidence that OER texts are of equal or better quality than traditional commercial textbooks. Concerns about the time and effort needed to identify appropriate OER remains. Institutions and departments could encourage adoption of OER through incentives, formal declarations, recognition, peer support, and inclusion of OER as evidence of teaching commitment in the tenure process.

OER does more than reduce costs. It provides a form of technology that promotes access and innovation. The ability to license course materials gives freedom to adapt a resource to one’s classroom. It breaks down the traditional boundaries and understandings of what a textbook can be. It allows for open and transparent dialogue about the discourses within psychology. Looking forward as OER evolves into OEP, Miller’s challenge could be exceeded by giving psychology away while fostering a nurturing and vibrant network among theorists, practitioners and students.

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CHAPTER  
15

# TECHNOLOGICAL AND CULTURAL CONSIDERATIONS FOR TEACHING AND LEARNING IN LOWER- RESOURCED ENVIRONMENTS: AN ACCOUNT FROM THE PACIFIC ISLANDS

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## INTRODUCTION

Some time ago, I had the fortune and privilege to be invited to lecture in psychology for a university that serves 12 Pacific Island countries. This university, headquartered in Fiji, also involves students from its member countries in the Cook Islands, Kiribati, the Marshall Islands, Nauru, Niue, Samoa, the Solomon Islands, Tokelau, Tonga, Tuvalu, and Vanuatu. Most of these students remain in their respective countries and engage courses through what had been termed an “online” mode of education. While I was present, this involved a blended approach of e-learning and a correspondence course style of learning; in other words, students were supplied with course materials either in print, or with access to print, but they also engaged in learning activities individually and with others via the Internet.

Coming from a background of teaching psychology in Western universities, and having some experience of teaching via the Web, there were technological as well as cultural challenges and considerations that I immediately encountered, and I learned that these were often interlinked. In this chapter, I want to share some of these encounters across themes of learning materials, satellite classes, and assignments. These discussions are applicable to the respective countries and cultures with which I worked, but I hope that they are also received such that their transferability to other lower-resourced environments might be apparent, particularly those where there is a need to take into account cultural differences.

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## LEARNING MATERIALS

At one stage, I was invited to redevelop courses for my school. While I was relatively confident with the topic content that could substantiate each of the courses, I was initially thrown by some basic considerations related to access. For one, the use of textbooks needed to be considered. Textbooks are a prominent feature of courses in the university, as they remain in many others worldwide, and while some suggest a move away from these to Wikis and other web-based content (e.g., Cragun, 2007; Lewin, 2009), not all students will have consistent access to the Internet, and so a book is something they can take away to use wherever and whenever they need to quickly look

up and check terms and topics, as well as read further on a broad subject. However, the university receives students from diverse backgrounds, some of whom can acquire textbooks without issue, but others are precluded due to the cost or other access issues. For instance, textbooks suitable for a course, which I thought to be reasonably priced back home, were very expensive when reviewing options for buying and shipping to locations in the Pacific. The university also sought to address the issue of cost by only approving textbooks priced at \$100 FJD (\$50 USD) or less, which presented a significant challenge when it came to identifying affordable core texts of a high quality. This meant passing over what might be considered staple textbooks to consider more obscure texts, often in their first edition, and potentially from publishers that do not send out reviewer copies, in order to identify cheaper alternatives. These texts ranged significantly in quality, sometimes swapping out expected core content found in course leaders for seemingly unconventional content, perhaps in an effort to differentiate themselves.

As an alternative, we discussed the potential of incorporating Open Education Resources (OERs) into courses. (See Tolman & Gurell's Chapter for a discussion of OER.) Such cost-free resources are ideal for lower-resourced environments and are often appreciated by students in terms of the quality of information (Cooney, 2017), and for those without easy access to computers or the Web, they can be printed at a cost much lower than a regular textbook. However, suitable OERs can be hard to come by, and for the courses I were working on, at the time of development there was not enough content across various sources to substantiate a textbook alternative. A further possibility was to develop in-house OERs, but these naturally require a significant time commitment, and depending on how far an author goes, significant knowledge of the subject area. For instance, a form of OER had been developed by the university for students to use prior to the online mode of learning coming into force. However, these were typically the minimum the student would require to learn about a topic and would be the only way this information would be delivered. Consequently, and unlike most textbooks, they would not tend to provide extended discussions of subjects for further reading, or the student's own interest, nor could they be used to clarify content that may be unclear when first presented (as a textbook might). To cater for these needs requires an OER that goes beyond minimum learning requirements to become a form of OER textbook. While desirable, this exceeded the resources available at the time.

Some publishers are aware of the high cost of textbooks and are starting to offer "e-rentals," where students can access an e-book at a cheaper rate, but for a limited period. While a good model for those only interested in books for the duration of the course, this system may rely on access to computers and the Internet, depending on the proprietary software systems the books would need to be viewed within. These are important considerations for students coming from lower or intermittently resourced backgrounds, who may be unable or unwilling to access content in this manner.

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## SATELLITE CLASSES

The university I worked at also sought to bring students together in what was termed "satellite classrooms." This meant that a classroom on the main campus would be set up in such a manner that it could be live-streamed to classrooms in campus centres at remote locations, which were simultaneously shared back to the hub classroom. The idea was to share the same classroom experience across multiple locations and at a relatively low cost. In other parts of the world, live MOOCs allow students to connect with teachers and other learners in similar ways via various

devices and from various locations, but due to limited access to technology and unstable connections<sup>2</sup>, the current set up in the Pacific Islands is to use the dedicated facilities in the campus centres.

I had experience in coordinating classes via the Internet, managing external participation through audio and video, as well as chat window contributions. However, I soon realised that participation from those connecting remotely was especially important in these classes, as these students came with their own particular cultural understandings and experiences that did not always align with the predominantly Fijian students who were physically present. For example, when discussing suicide prevention, a nationwide programme that had been run in Fiji was raised as an example by the students present to illustrate a means of raising awareness and decreasing the incidence of suicide. This programme would not necessarily be known in all Pacific Island countries, and may not be appropriate if run elsewhere, given cultural and political differences between countries.<sup>3</sup> While including examples from all backgrounds was not always possible nor sensible, the example illustrates that wider participation is important to encourage greater understanding. In life beyond Fiji, I am becoming aware of other kinds of dominant and typical environments that may constitute a source of centrality, such as thinking in terms of urban vs. rural, affluent vs. poorer backgrounds, or local vs. international learners. In addition to avoiding alienating learners, centrality is worth reflecting and bringing to the attention of students simply to encourage a diversity of perspectives and experiences that may come from those beyond our immediate environment.

There were also various reasons why students could not attend live sessions. In addition to personal circumstances that prevented their presence, power outages and connection difficulties sometimes rendered the remote centres unavailable. Recording these sessions at least provided access to the content later, but I found it important to encourage students to engage with the recordings as if they were present, sharing thoughts on content and completing activities via forums and in emails directly to me. In this way, absent individuals had the next best thing to being present in the live session, but it also meant I could share a summary of their contributions with the class in the next session. Not only does this foster a greater sense of inclusion in the individuals contributing, but those absent tended to be the same each time, and so represented particular demographics of the class. Affording these opportunities to be included ensures the contributions of these groups are not missed out on by the rest of the class. Therefore, although the structure of the series of satellite classes could be planned well in advance, it was important to make time at a point during the session to incorporate the input of those who had missed the previous live sessions, giving a sense of greater interactivity, inclusion, and continuity.

In Pacific Island countries, as in many parts of the world, language comprehension is an additional concern, if the language or accent of a speaker or participants is not common to all. The courses at the university are delivered in English, but ability in understanding and writing English varies between and within countries. I had been advised to speak as slowly (and clearly) as possible to cater to the lowest ability, but some students from Fiji, where encountering English and a variety of accents is fairly common, expressed frustration with teachers who conducted classes at a particularly slow pace, which they found off-putting and made concentrating difficult. To manage varying abilities and preferences, I discovered that some streaming platforms (such as YouTube) are able to manipulate the pace of recordings to speed them up or slow them down, without significant distortion. While this may not be of much use in live sessions, where I tried to speak clearly and steadily, without drastically reducing natural speed, and where I invited participants to request clarification whenever they needed, I was able to provide recordings in a form

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<sup>2</sup> I had been advised that some students would need time to get to these classes from their home and from work, some of whom used paddle boats to get from villages to their local campuses.

<sup>3</sup> Milner and de Leo (2010) cite Tonga's stance of suicide as a criminal offence as an example of the need for initiatives to be developed per area or country to take into account cultural differences.

that students could manipulate to suit their individual needs. Interestingly, services like YouTube also provide a closed captions service, so that subtitles can accompany recordings. This text can be downloaded separately and uploaded alongside recordings as transcripts, which serve students with varying accessibility requirements. While this technology is in its early days and the accuracy of transcripts will regularly need to be monitored, it does serve as a quick and free alternative to traditional transcription.

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## COURSEWORK/ASSIGNMENTS

Setting and managing assignments also requires some additional considerations in less resourced environments, as I discovered during my time in Fiji. For instance, in psychology we are encouraged to involve the evidence base when writing essays on topics, but if the current “gold standard” of evidence tends to be found in higher ranking peer-reviewed journals, typically behind publisher paywalls, the journals may not be subscribed to, and thus, much of the material may not be accessible. Therefore, I would encourage access to whatever sources were available, but also encourage greater scrutiny of these resources. We often try to encourage critical thinking about knowledge and sources, especially as journal articles themselves are often contentious, but in these situations where access may be restricted, I would advocate greater space to thinking about source validity and credibility in assignments, rather than focusing on the number of primary sources involved.

One student also described to me the challenge of finding time to visit the campus centre to work on a computer to do her assignment and to submit it. Therefore, an additional concern is the real time students can access computers, the Internet, or other resources (e.g., campus libraries) to work on assignments. This may vary significantly and can be quite a contrast from a typical Western student who is able to remotely work on assignments whenever they have time to do so. For students in lower-resourced environments, it is important to allocate sufficient time for individuals to receive assignment instructions, to consider their approach, the length of time they can realistically dedicate to accessing sources, and if these are spread out, additional time to recap and reflect before redrafting or working further.

Similarly, when group work took place, I became aware of the need to share such considerations with others so that those with greater access to resources could be more sympathetic and able to manage time and input from groups with members who had lower access. Those with greater access to sources (through larger campus libraries or greater availability of Internet) could sometimes take roles within groups of information gatherers, while others held roles as evaluators. As group work allows for connections to be made between individuals of varying backgrounds, I was also aware of the need to encourage listening without judgement and other ways that students could get along with each other better.

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## CONCLUDING REMARKS

Working in Fiji with students from across Pacific Island countries gave me insight into the challenges involved in teaching and learning within lower resourced environments, as well as important considerations when working with individuals from diverse backgrounds. Some of the approaches to situations and workarounds to issues may be useful to other comparable learning environments. I found that fostering an atmosphere of openness helped to identify some of these issues, and while resources may not always be plentiful, creative solutions can generally be found to support those that are enthusiastic about learning wherever they are.

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CHAPTER  
16

# DESIGNING INCLUSIVE ONLINE ENVIRONMENTS FOR STUDENTS WITH DISABILITIES

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## INTRODUCTION

Creating an inclusive and equitable online environment requires that faculty have a clear understanding of the underlying principles of Universal Design in Learning (UDL). The underpinnings of UDL postulate that barriers are not solely inherent to the individual with the disability, but lie in the barriers created by society and the environment (Meyer & Rose, 2005). Thus, faculty play a critical role in ensuring courses are designed to meet the needs of all students and to remove barriers.

According to the National Center for Educational Statistics (2016) approximately 11% of undergraduate students report having a disability. UDL does not only benefit students with disabilities, but its principles of representation, expression and engagement aim to meet the needs of all students (Rose & Meyer, 2002). The success of students with disabilities in online education is precipitated on how faculty design their courses for access, inclusion and engagement. Betts (2013) purports that “Success for online students with disabilities requires an institutional commitment to accessibility.” Not only is an institutional commitment necessary, but a personal commitment by each and every faculty member also is required. While some higher education institutions have made strong commitments to supporting the needs of students with disabilities by providing training to faculty, many fail to hit the mark. Indeed, the availability of training for faculty on how to provide inclusive strategies in the online environment is very limited on many campuses.

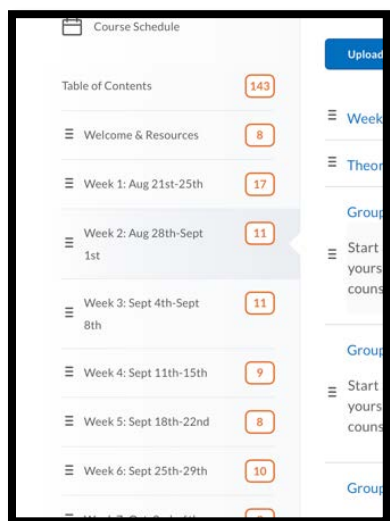
Online teaching environments vary within institutions and across institutions in how courses are designed, how content is delivered, and by level of engagement of the user. The student experience from one online course to another, even within the same program, can look very different. When an instructor creates a course, the content can be displayed in a variety of formats, and in several places in the Learning Management Systems (LMS). Navigating the information can be frustrating and confusing for any student, but can pose an even greater challenge for students with disabilities. Taking into consideration a few simple guidelines will not only make the online environment more accessible, it will make the experience more positive for all students.

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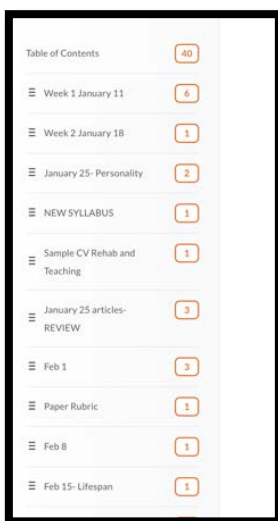
## CONSISTENT AND STANDARDIZED COURSE SET-UP

When designing the online class environment, faculty should work together to ensure students access information the same way across all courses. For example, below are screen shots from an online LMS highlighting three different classes within the same program. Each class has appropriately labeled folders, but still present challenges for

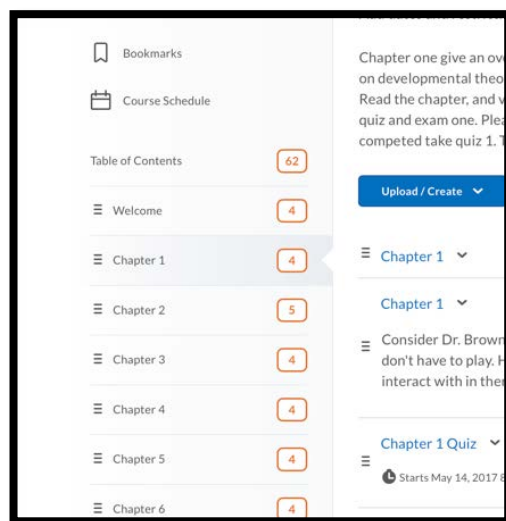
students who use assistive technology to access the course materials. In Example 1, the Table of Contents labels each folder with the week and the date range. This set-up is helpful for students using screen reader technology when trying to find the correct folder to access information. In Example 2, the folders are randomly labeled by week, sometimes by date, and sometimes by topic. A student in this course would most likely need to frequently refer to the syllabus to make sure which week and topic was needed. In example 3, the folders are labeled by week number, such as week 1, week 2 and so forth. This set-up also requires students to refer to the syllabus to check the appropriate “week” folder the student should be accessing.



EXAMPLE 1



EXAMPLE 2



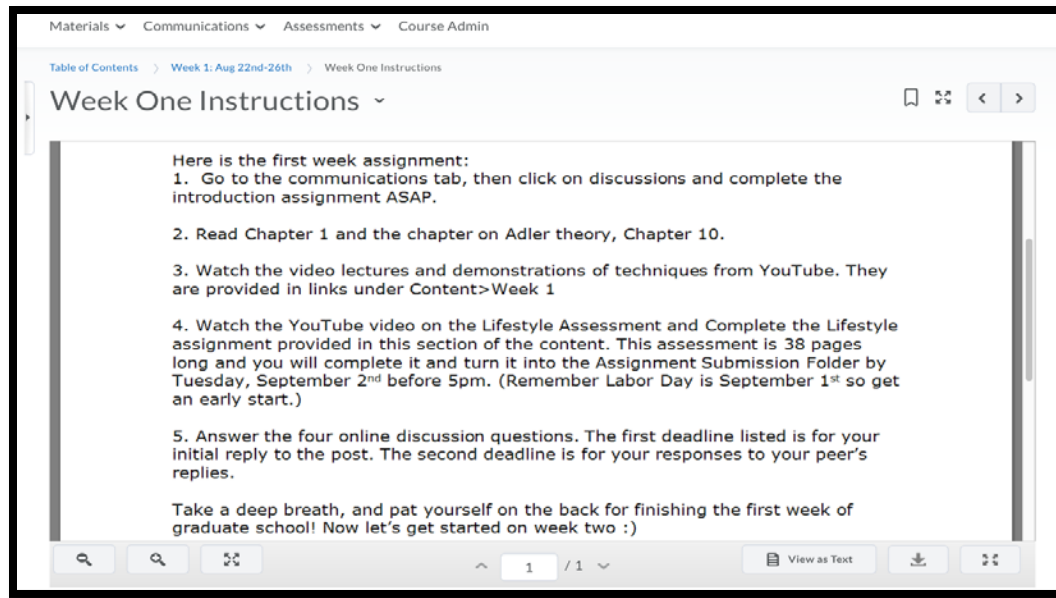
EXAMPLE 3

The greatest challenge with the three examples above is that students are required to navigate each course differently. Learning to navigate each course in such different ways can cause frustration and confusion, particularly for students who struggle with the use of technology and those needing to access technology in different ways. Conversations across programs and disciplines should be focused on how an institution can provide students with an experience that is similar in the online environment. When students enroll in a class they should feel like they are enrolled at a specific university and have the same feeling across all of the courses they take. Course set-up consistency will reduce barriers, reduce frustrations, and allow for easy navigation.

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## PROVIDE CLEAR INSTRUCTIONS FOR COURSE REQUIREMENTS AND ACTIVITIES

Most LMSs have common features such as modules for content, discussions, assignments, and announcements. Frustration can ensue if courses are setup to require the student to check each module every time they log on for learning. Navigating each of these modules should be clearly explained in the same place each week to reduce unnecessary “running around” in each module. In the example below, instructions for Week 1 were uploaded in the Table of Content folder labeled Week 1: Aug 22-26. In reviewing the content, the instruction provides the student with clear directives about what tasks are required and where to find the activities and materials. It is important to note that the names used in the instructions are the exact labels used by the LMS at the institution. Using consistent labels is critical in making sure students who are accessing the information through a screen reader can find the appropriate modules.



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## ONLY USE MATERIALS THAT ARE ACCESSIBLE

The Internet provides a smorgasbord of media for faculty to choose from when creating activities and choosing materials for their courses. Adopting an inclusive philosophy in your course means if it is not accessible to all students then you should either make it accessible or use something else that is accessible.

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## VIDEOS

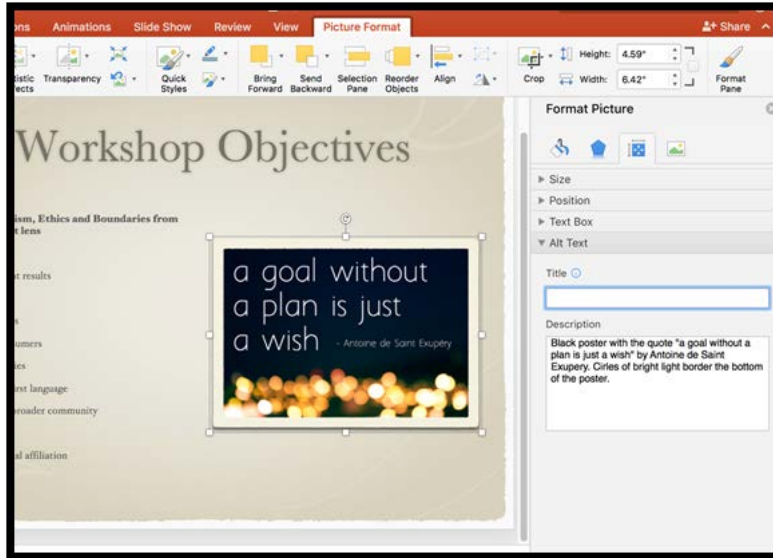
When you choose media for your course activities use only media that includes captions and audio description. If captions are not available, you can check to see if there is a transcript, but that is not ideal. This includes both rented and online media. If you request a student to watch a specific movie or video about which they will respond, you should only choose those which are accessible. When choosing captioned or described videos posted online make sure to check for accuracy because some videos are not captioned or described correctly. Many YouTube videos are captioned, but they are not always accurate due to the use of automated voice recognition software, which has errors. Sometimes podcasts and webinars are not captioned but a transcript is provided. If a transcript is provided make sure you upload the transcript with the media. When creating your own videos choose an accessible media player. You should choose a player that is fully accessible and can be used across platforms. There are free online tools available to use that add captions and audio description to videos you or your students produce.

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## GRAPHICS IN POWERPOINT AND MICROSOFT WORD

PowerPoint presentations are a great tool to supplement an online lecture. Whether it is used as a stand-alone presentation, has audio embedded or is used in a video presentation, steps should be taken to ensure accessibility. PowerPoint has many accessibility features included in the software, but you must use the slide templates to make sure that your content is accessible. Secondly, you need to add descriptions to any graphics that are used in your presentation. In the example below, the PowerPoint slide highlights how to add text descriptions to your graphics. Please note that your description should go in the description box, not the title box.

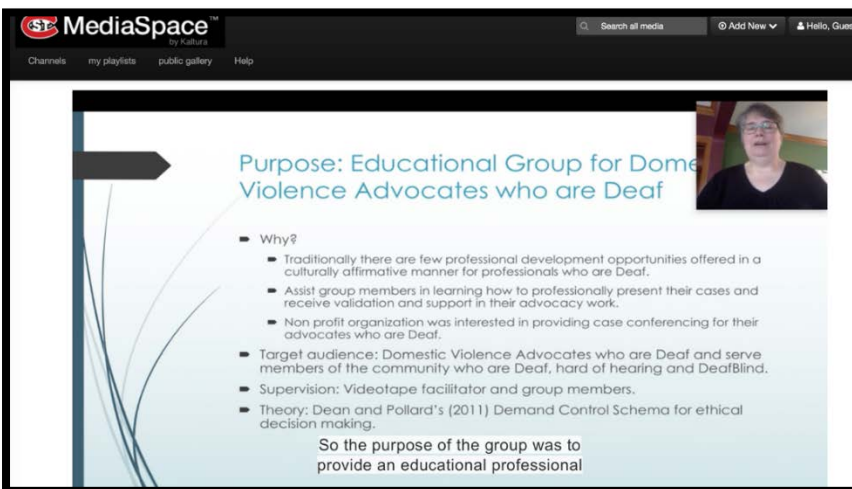




There are several online websites that provide in-depth information on how to make your Microsoft office documents more accessible. If you add audio to your PowerPoint then you should either add captions or provide a transcript.

#### BE A ROLE MODEL FOR INCLUSIVENESS BY REQUIRING STUDENTS TO DEMONSTRATE THE SAME

Demonstrating inclusive and accessible environments goes beyond simply accessing the online environment. It is also a critical teaching tool in demonstrating how students should approach future work environments to be more inclusive. If students are required to post videos, all efforts should be made to ensure they are closed captioned and to clearly describe any visual information. Requiring students to caption their own presentation is not difficult, and it reinforces the philosophy that faculty should create more inclusive environments that are accessible to all. There are several do-it-yourself captioning tools including YouTube CaptionTube. Below is an example of a presentation created by a student (Wilbert, 2017) using MediaSpace's automatic captioning software. Below the video is a transcript of the presentation.



Other accessible techniques that students should employ in their presentations include teaching students to use minimal text on the PowerPoint slide, and only use the text to make a critical point. Students should speak clearly and read what is on each slide to provide access to students listening to the presentation.

Below are some considerations for designing inclusive environments for students with specific disabilities. Although this is not a comprehensive review of all disability categories, the recommendations mentioned may be helpful in general and should start you thinking about potential universal design strategies to remove any barriers.

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## CONSIDERATIONS FOR STUDENTS WHO ARE DEAF OR HARD OF HEARING

The number of students who are deaf or hard of hearing entering postsecondary education settings continues to grow (National Deaf Center on Postsecondary Outcomes, 2017). One of the challenges of helping students stay in postsecondary education until graduation is ensuring that they have an equal platform to learn and succeed with their peers who can hear. This challenge can be especially daunting in an online learning environment.

One of the first and foremost principles of providing access to any environment is asking the person what they need for accommodations and not assuming anything. This is of course, assuming that the person has disclosed they have a need for accommodations. People who are deaf or hard of hearing vary greatly in their level of hearing loss, how they communicate, what they prefer for communication, how they learn and how they receive information. It is not a one-size-fits all, like building a ramp for someone who uses a wheelchair for mobility. However, there are some things that can be done to ensure basic online access for a student who is deaf or hard of hearing. Some of these tips may help students who can hear as well.

Here are some general recommendations for providing accommodations to online learning environments for a student who is deaf or hard of hearing:

- Making all information that is auditory, visual.
- Captioning all videos or providing transcripts as needed when captioning is not available. There are many ways to provide captioning, and free software to assist in doing so. Try to avoid captioning through Voice Recognition Software or automatic voice recognition systems as those tend not to be as accurate.
- Using PowerPoint, KeyNote or some other type of tool to present information visually, and if voicing at the same time, ensuring that is captioned, either through purchasing Video Remote Captioning services live or through a pre-recorded captioning option.
- When hosting a synchronous class, ensuring access to ASL interpreters for students who use sign language to communicate or CART services for students who prefer captioning for accessing communication in their classes.
- Ensuring the student is involved in the conversation by making the interaction a pace that can be interpreted or captioned accurately and timely.
- Inserting the ability to enlarge text or change colors or fonts as needed.
- Allowing auditory information to be controlled by students if the volume needs to be raised or FM system used.
- Having one person speak at a time and identify himself or herself by name before speaking will help reduce confusion and provide respect for individual input.
- Using a platform that allows for IM chat boxes so that all students can interact visually rather than by phone.

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## CONSIDERATIONS FOR STUDENTS WITH PHYSICAL DISABILITIES

When planning an online class, there are several things that you will want to take into account when you encounter a student with a physical disability. Do not assume that because your class is online that it is accessible. A student may have a speech impairment, or you may have a student with a sensory disability. Students with a physical disability affecting their motor control, (e.g., Cerebral Palsy, Muscular Dystrophy, Multiple Sclerosis, or Arthritis) may use adaptive software on their computer; however, if the software is not compatible with the content of the course, your class would not be accessible.

Depending on the particular disability, additional time may be needed to allow a student to complete assignments and projects. For example, if a student's disability affects his or her fine-motor skills, he or she will more than likely require a much longer time to type out words on their keyboard. You may also have a student in your class who, due to his or her disability may require the use of a mouth-stick or head-stick to type, which of course will require a much longer time and much more energy to type, which in many cases will result in a lot of fatigue for the student. You may also have a student, who, due to his or her disability, cannot use a keyboard at all, in which case he or she may use their voice to dictate commands to a voice-recognition program on his or her computer. When it comes to voice-recognition programs, one thing to be aware of is whether the content of your class is compatible with the student's voice-recognition technology. Naturally, this will mean working closely not only with your Disability Resource office to determine what accommodations may be appropriate, but also with your IT department to ensure that different assistive technologies are compatible with the course content. There are of course other situations that may arise regarding accessibility of your online course. However, by working closely with your Disability Resource office, many issues can be resolved.

Here are some general recommendations for providing accommodations to online learning environments for a student with a physical disability:

- If the student is using assistive technology to access the class make sure you understand how that impacts the student in responding to discussions, accessing course content, navigating the site and taking online quizzes and exams.
- Provide a copy of instructions or class notes.
- Provide ample time to complete online quizzes and exams. Consider if a timed test is necessary. Are you testing knowledge or how fast one can recall the information? If you are concerned about using course materials, consider a proctored exam. Most disability services offices have testing rooms for students with disabilities.
- When designing online class activities consider how the student with a physical disability will be able to participate equally.
- If the student has a communication disability take time to understand what his or her comments are and repeat them to ensure communication is clear and accurate.
- One person speaking at a time and identifying himself or herself by name before speaking will help reduce confusion and provide respect for individual input.
- Using a platform that allows for speech to text for IM chat boxes so that all students can interact.

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## CONSIDERATIONS FOR STUDENTS WITH VISION LOSS

Students with vision loss use a variety of tools and devices to access online content depending on level of visual impairment. Regardless of the type of tool a student uses to access the course it generally takes a lot longer to read or listen to the material. In addition to accessing the course material, students who use a screen reader must rely on headings and links being appropriately labeled to get from one link or folder to another. New technologies are being developed every day to assist in accessing online information, but not every student is aware of what is available or has learned to use all the technology. Take the case of Wally.

**Wally's Story:** For 58 years, I have been living my life as a blind person. I attended college in the early 1980s. At that time, online instruction wasn't an option. If I had the opportunity to access my classes online like students do today that would have been the biggest game changer for me. The introduction of the Internet has made a significant impact on my life and access to a world of information. As a person, who is blind, the Internet has opened up a whole new world for me. I am able to communicate with others, and access information that I never knew was available. More important in the development of the Internet was the creation of screen-reading software. This means literally anything I have on my screen will be read back to me. To make it even better for me was the advancement of software that has made it possible to use touch screens; something I thought I would never be able to do. My college experience would have been so much better if I were afforded these opportunities when I was in school. There would have been no dragging around books or carrying that heavy tape recorder to record and playback the audio of my classes; the issue of getting to class would have been less stressful. Accessing all the visual information in the class such as class notes from the professor, information written on board, handouts and materials in an online course would have been a big benefit for me (W. Waranka, personal communication, July 28, 2017).

Online courses provide a less stressful environment for the student with a vision loss when considerations for accessing visual information is taken into consideration.

Here are some general recommendations for providing accommodations to online learning environments for a student who has a vision loss:

- Making all information that is visual, auditory.
- Provide all video media such as television shows, movies and videos with audio descriptions. Audio description provides important information about what is happening on the scene that is seen but not heard. It provides what is happening so the student can follow the plot of the scene.
- Add alternative text descriptions (alt tags) to any pictures or graphics used in class materials.
- Be considerate of how much reading is required; this includes online instruction, discussion posts and dialogs. It can get very difficult and time consuming to get through.
- When providing handouts to students make sure to ask the student if they need a specific font, size or color.
- If there are graphs or other visual charts work with disability services to provide raised line drawings and tactile modes.
- Provide detailed instructions on completing and submitting assignments. For example, do not type "post in the dropbox;" instead post "submit assignment in the folder labeled xxxx located under the Assignments Tab."
- Relay visual information that is happening in the online environment such as announcing when the "raise hand" tab is being used.
- Alternative testing formats may be necessary. Work with the student to find out what his or her needs are.

- One person speaking at a time and identifying himself or herself by name before speaking will help reduce confusion and provide respect for individual input.
- In a synchronous environment make sure all visual information is read such as PowerPoints, information on the white board and handouts.

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## CONSIDERATIONS FOR STUDENTS WITH ATTENTION DEFICIT (ADD/ADHD) AND LEARNING DISABILITIES

According to the Learning Disabilities Association of America (2017), Attention Deficit Disorder (ADD) and Attention Deficit Hyperactivity Disorder (ADHD) are not considered learning disabilities. However, they share some of the same challenges in higher education. Students may have difficulty with focusing, comprehension, and listening to lectures. Providing instruction in a multi-modal way is the best approach to meeting the needs of diverse student learners.

Here are some general recommendations for providing accommodations to online learning environments for a student who has ADD, ADHD or a Learning Disability:

- Make sure all information that is auditory is visual, and all visual information is auditory.
- Provide information in multiple formats.
- Organization is key. Make sure your course is highly structured and organized.
- Develop several shorter presentations that use a variety of aids to keep students' interest instead of one long presentation.

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## CONCLUSION

Incorporating inclusive teaching strategies provide students with disabilities the access needed to be successful in their courses. The benefits of inclusive designs reach far beyond students with disabilities and helps all students, students from diverse backgrounds, non-traditional students, and ESL students. Additionally, students come with a range of learning styles and providing them a variety of accessible formats meets the needs of all learners. Applying the principles of UDL helps to create an online environment that is inclusive and equitable. This philosophy compels faculty to design environments that are accessible to all students regardless of their abilities. While this article provided practical considerations for designing an inclusive online platform, additional and continuing education training for the platforms used at your institution is highly recommended.

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## RESOURCES TO CONSIDER:

- National Deaf Center on Postsecondary Outcomes - <http://www.nationaldeafcenter.org>
- American Foundation for the Blind - <http://www.afb.org>
- United Cerebral Palsy - <http://www.ucp.org>
- Center for Applied Special Technology - <http://www.cast.org>
- Learning Disabilities Association - <https://ldaamerica.org>
- Disabilities, Opportunities, Internetworking and Technology - <http://www.washington.edu/doi/>
- National Center on Universal Design for Learning - <http://www.udcenter.org>

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- National Deaf Center on Postsecondary Outcomes. (2017). Postsecondary enrollment completion for deaf students. <https://www.nationaldeafcenter.org/sites/default/files/Postsecondary%20Enrollment%20and%20Completion%20for%20Deaf%20Students.pdf>
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CHAPTER  
17

# DIGITAL TOOLS TO DELIVER CONTENT AND ALLOW FOR INTERACTION

DIANA M. MILILLO AND ADAM PILIPSHEN NASSAU COMMUNITY COLLEGE

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## INTRODUCTION

Any introductory psychology professor can tell you it is not an easy task to teach upwards of 15 chapters of content in a given semester. After making time for introductions and assessments, this leaves professors with little time to both ensure students understand key concepts and allow for deeper interaction with the material and each other. Many instructors look to digital tools - either web-based or downloadable software - to help with the demands of teaching content heavy subjects to a tech-savvy student body in short periods of time (Perez & Hurysz, 2011).

Earlier chapters in this e-book describe how technology has revolutionized education. For digital natives, or those who have grown up with access to the Internet, finding information online is easy, and students today no longer need to have solely content-driven classes. The increasingly popular model of the “flipped classroom” is one in which instructors can direct students to lecture or content-based resources outside the classroom, and then spend their face-to-face time participating in deeper cognitive or interactive-type learning activities (LaFee, 2013). While there are many well-made psychology videos (audio, visual, and content) or podcasts (audio and content) already available online (e.g., Khan Academy), instructors may also choose to create their own. By making their own content materials, instructors can: a) feel confident that the material conveyed is specific to their teaching goals, and b) increase the sense of connection to their students. Instructors may also want a digital record of their own lectures for students to review on their own time. As we will describe, presentation-making software has come a long way since the inception of Microsoft’s PowerPoint, and today’s tools will (with sometimes minimal effort) allow instructors to create engaging presentations that are portable and work with many sharing platforms.

Besides using digital tools (e.g., videos, slideshows, podcasts) as an outside resource to learn or review content independently, many digital tools described in the sections below allow for more interaction between students or to have the students interact with the material on a deeper cognitive level and check for comprehension (Gupta, 2014). Yet, how do psychology instructors master the ever-changing world of digital technology? The choices of digital tools that can be applied to education are overwhelming, and are the subject of many education-related blogs which have the ability to report on newer, cutting-edge tools faster than can be published in journals. We recommend one need not feel overwhelmed in keeping abreast of all the newest tools, but experiment to find one that works for one’s primary needs and goals and develop some technological expertise with that.

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## SECTION 1: DIGITAL TOOLS TO DELIVER CONTENT

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### PRESENTATION-MAKING TOOLS

The first section will be a short review of a few tools that create or organize content to be used for self-instruction outside the classroom (i.e., flipping the classroom), storing one’s class lectures in a format that allows students to

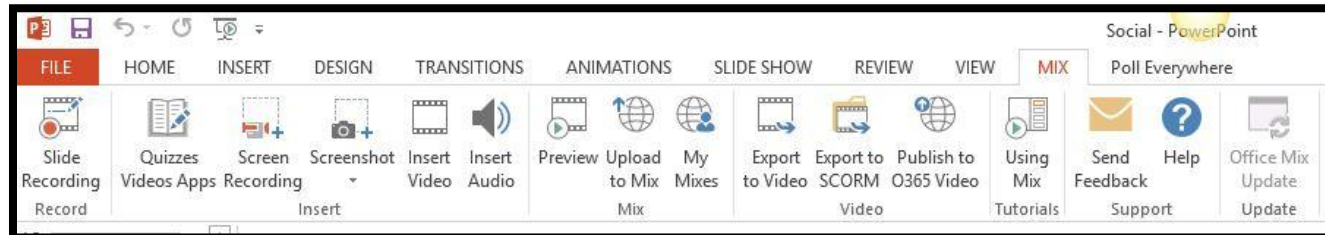
revisit the material after class, or having students generate their own content. We will review several presentation-making programs: Microsoft Mix, Emaze, Canva, and Powtoon. While this is not a thorough review of presentation-making programs, it showcases features, differences, and possible areas of utilization in courses. (A discussion of Google Slides, another popular presentation-making program, will be discussed in Section 2 because of its highly interactive capabilities).

## MICROSOFT MIX

While many presentation-making options are available today, Microsoft's PowerPoint continues to be a favorite among professors to use in the classroom for helping to deliver content or emphasizing key points (Clark, 2008). Its familiarity among students perhaps plays into the perception that lecture material presented using PowerPoint seems more clear and organized, although there are dangers of PowerPoint presentations being dry and unengaging (Eves & Davis, 2008). A free downloadable add-on for PowerPoint versions 2013 and 2016, called Microsoft Mix, can help make static PowerPoint presentations become more dynamic, portable, and interactive.

Microsoft Mix uses PowerPoint slides as its base to incorporate video recordings from a webcam, screen recordings, inking (highlighting or pen notations), and quizzes. Mix can be especially helpful in transforming PowerPoints into videos that instructors can share with students or use as a supplement in face-to-face classes. With an easy-to-use functionality, Mix embeds itself as a tab within PowerPoint. Once you click on the Mix tab, a menu of options allows you to insert video, audio, inking, or quizzes into each slide (see Fig. 1).

FIGURE 1. MENU OPTIONS IN MICROSOFT MIX



Mix appears as a menu tab directly in PowerPoint.

The first author often creates video recordings of her explaining key points on each slide, which can then be placed anywhere on that slide and appear as big or small as desired. One nice thing about Mix is that users can record and edit slide by slide; making a mistake does not necessitate that the user has to re-record an entire presentation. Using the tab menu, one can also check for comprehension of content by inserting quiz questions (also see section below on Adding Comprehension Checks in Presentations). Selecting this menu choice connects to Microsoft's app store where users can choose to embed one of their popular apps for multiple choice or polling-type questions. Finally, Mix has the capability of allowing users to finalize their presentation and store it in a number of ways. Because of the video files that may be embedded on each slide, the full presentation may be too large to expect students to download onto their own devices, and hosting these presentations on a web-streaming service is recommended. Users can save the entire presentation as an mp4 (video) file, which can then be uploaded to various video hosting services (e.g., YouTube) or one's learning management system (e.g., Blackboard or Canvas). Microsoft also allows users to sign-in and upload videos to their own "Mix" site, which can be shared via a web link. The benefit of hosting one's videos on their own Mix channel is that analytic data is recorded to see how long students viewed each video and spent on each slide, which may also be available if the video is embedded in a learning management system.

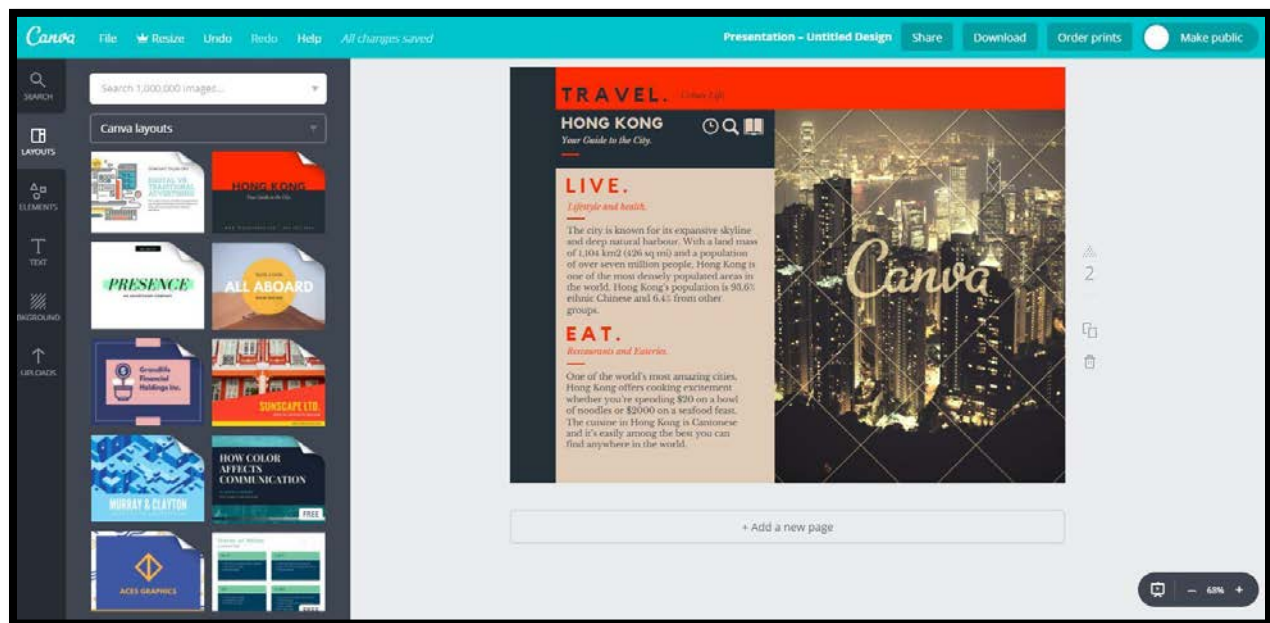


Mix is directly downloadable for Windows computers (<https://mix.office.com/en-us/Home>), but not the Mac-based version of Microsoft Office. (See Mix’s downloadable help guide for teachers, Office Mix Help Guide, 2017).

## EMAZE AND CANVA

While Prezi (<https://prezi.com>) takes credit for being PowerPoint’s main competitor in popularity (especially for its non-linear and dynamic design) (Chou, Chang, & Lu, 2015), there are still many other programs seeking notoriety as equivalents to PowerPoint. Web-based programs such as Emaze (<https://www.emaze.com>) and Canva (<https://www.canva.com>) offer the capability of being a “one-stop shop” to create many other types of media, such as websites, blogs, advertisements, infographics, as well as presentations. Both platforms provide beautiful and artistic templates, including use of a large repository of high-quality photos. Students may be impressed by the artsy and eye-catching designs of these presentations (see Fig. 2), which can be made to look more like an advertisement than a standard slideshow.

FIGURE 2. PRESENTATION DESIGNS IN CANVA



Canva features artistic design templates for presentations.

Presentations can be designed directly on line, in a way very similar to PowerPoint, and there is no need to install any additional software. Both websites offer many free utilities, though there is a nominal fee to use certain pictures or templates on Canva (most \$1 per high-quality picture) or a monthly single-user fee for creating more than 5 presentations or websites on Emaze (which equates to one annual charge of \$54 for a Pro Edu account). Emaze boasts much more functionality in creating presentations however. It can sync with personal YouTube or Flickr accounts to seamlessly integrate media. All presentations are saved in real-time, with cloud-based storage. Both sites offer the ability to download your presentations (see Fig. 3 next page), though Canva only allows users to download their presentations as picture (jpg) or PDF file formats, while Emaze allows users to download their presentations as PDF, HTML (web-based), mp4 (video) files, or by viewing through its own Emaze Viewer (which requires a separate install to a computer or tablet).

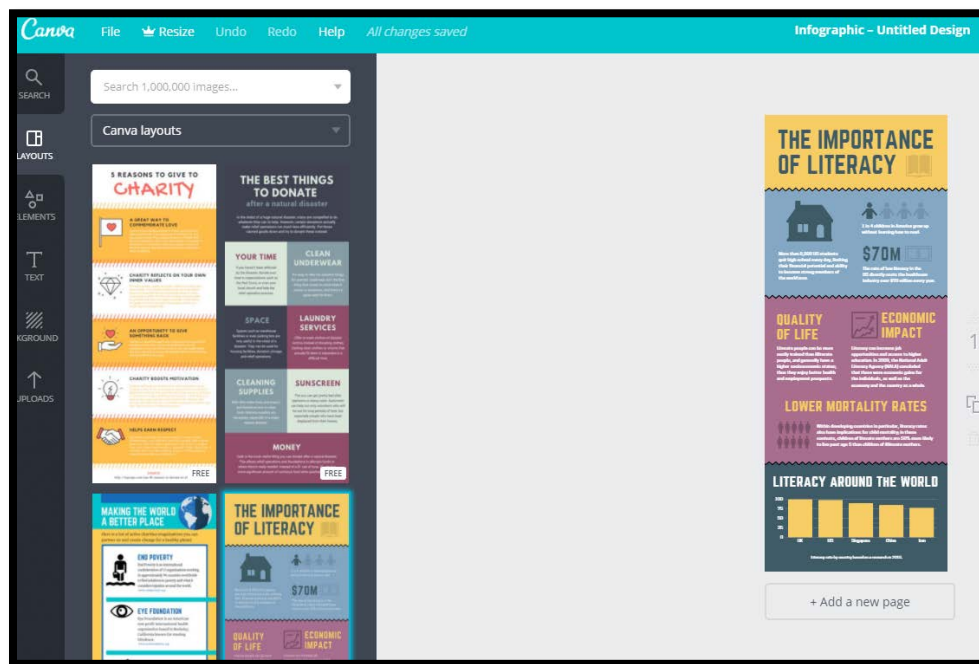
FIGURE 3. FILE SAVING OPTIONS IN EMAZE



Emaze offers options to save completed presentations as a static pdf file or a video file.

Professors may also opt to create a free website with Emaze, and house presentations on their site, which will allow Emaze to record data analytics of presentation views. Instructors may want to use Canva for student assignments – such as creating a detailed one-slide infographic (see Fig. 4).

FIGURE 4. CREATING INFOGRAPHICS IN CANVA.



Canva can allow students to create their own infographic.

Besides the web-based functionality, an assured highlight in tools such as Emaze and Canva is in design; these are sure to create presentations with beautiful, artistic quality.

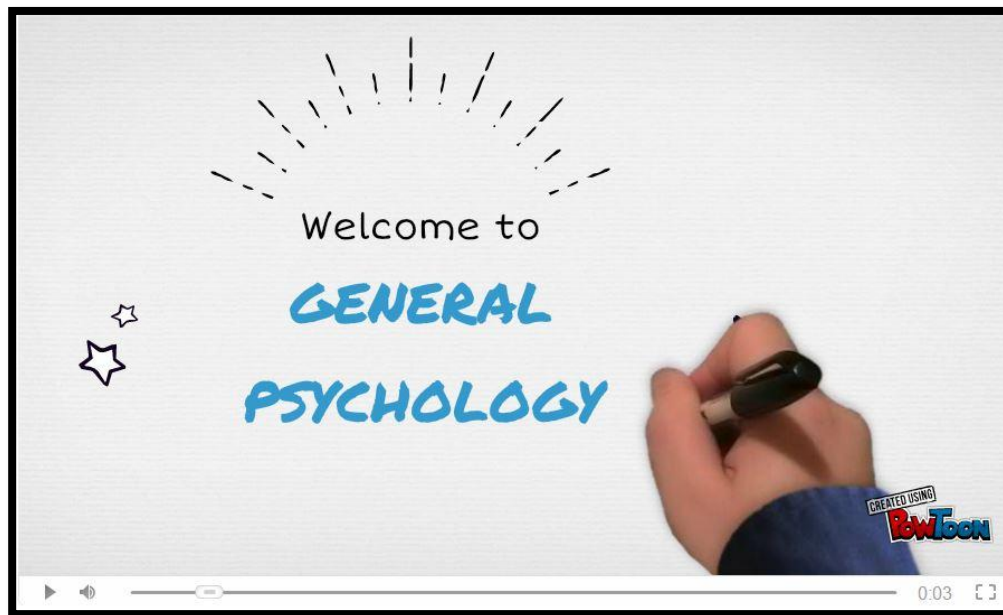
## POWTOON

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In a similar vein, Powtoon will dazzle an audience with clever and highly customizable animation videos. Want a hand to write out the title of a slide, or a stick figure body with your face attached (see Fig. 5)?

FIGURE 5. ANIMATION OPTIONS IN POWTOON

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Customizable options for short, animated videos in Powtoon.

The possibilities for creating crafty and engaging slides are endless – and with that, can take a long time to craft. However, the end product will have students thinking you are a witty and creative professor. Powtoon is a tool that can best be used if there is a quick concept needed to be addressed in a highly engaging manner – such as a first-day introduction. With a basic and free account, users can make up to 5 minute videos, with limited storage on their site. Creating these animations is similar to other presentation-making programs; users can start with a blank slide or choose from a template (where much of the work is done for you) from which to start personalizing. Due to the motion and animations, the end product works best if it is run as a video slideshow; however, presentations can be downloaded and run offline as a PowerPoint file as well.

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## ADDING COMPREHENSION CHECKS IN PRESENTATIONS

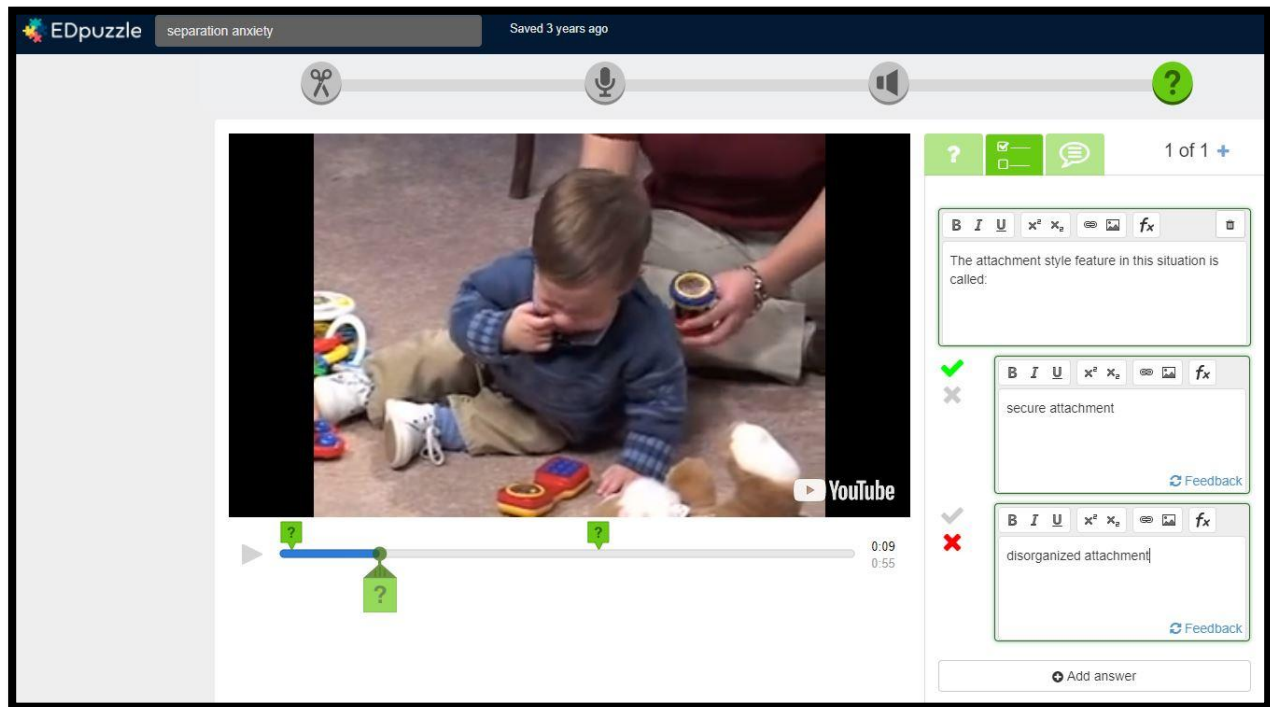
### EDPUZZLE

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As we described above, many of the presentation-making programs have the capability of saving one's presentations as a video file to be downloaded or shared directly on YouTube. With a handy (and free) application called EDpuzzle (<https://edpuzzle.com>), users can embed questions directly into YouTube videos, including videos that one uploads themselves or videos that already exist on YouTube. Within the EDpuzzle Teacher menu, users can search for a video

on YouTube, and decide to crop a portion of the video if necessary. Then, at self-selected points in the video, users choose to insert an open-ended or multiple-choice question, indicating the correct answer choice (see Fig. 6).

FIGURE 6. EMBEDDING QUESTIONS IN EDPuzzle.



The squares on the timeline above represent separate questions that will appear at those points in the video.

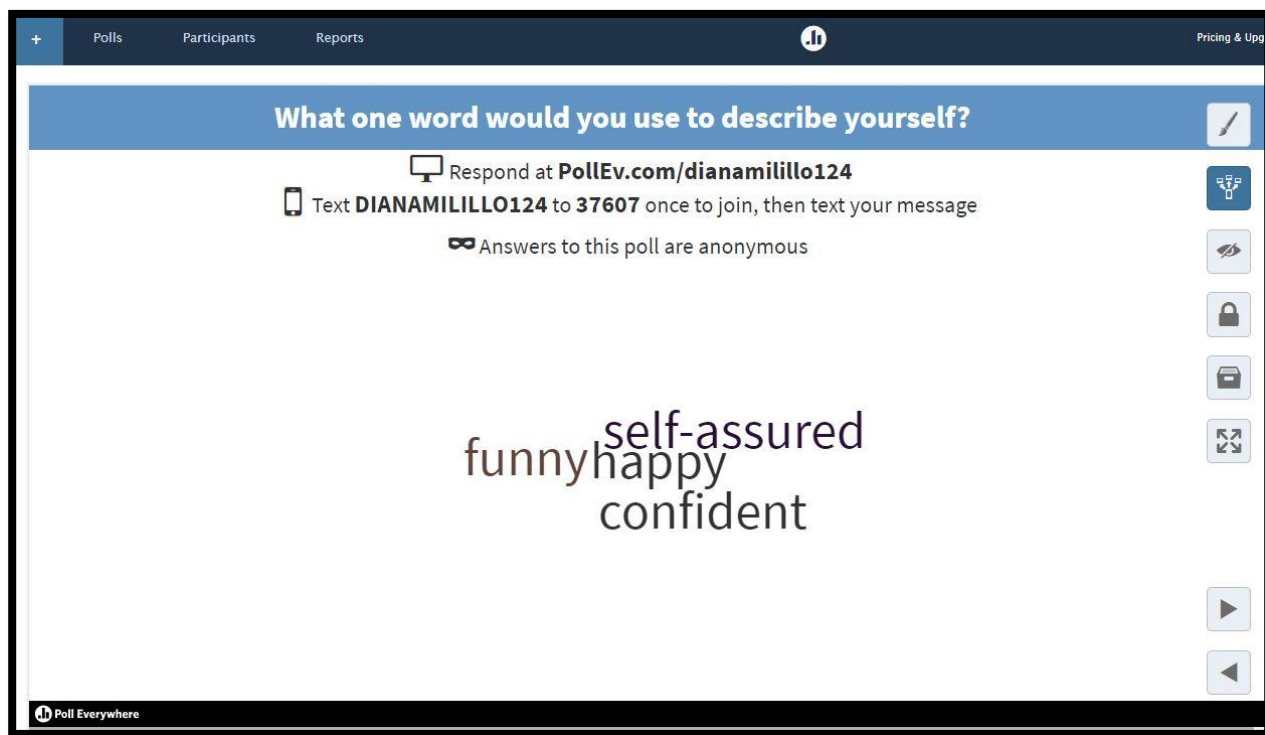
EDpuzzle videos work seamlessly with Google Classroom, in which teachers can assign to a class, and set control features such as assigning a due date and turning on/off skipping question capabilities. If an instructor does not have Google Classroom, they can still use EDpuzzle with students and capture analytic data, although the process requires sending out a link to the video and having students sign-in. If an instructor is not concerned with having analytic data, the video can be played in the classroom and students can simply write down their answers. While this platform transforms the passive nature of watching videos into a more cognitively active one, a major drawback of EDpuzzle is that instructors must consistently monitor videos that they have not themselves uploaded on YouTube. If videos are taken down, then the EDpuzzle integrated quiz will no longer work.

## POLLEVERYWHERE

As a free competitor to clicker-based interactive tools, PollEverywhere (<https://polleverywhere.com>) is a great platform to engage audiences in many different types of comprehension-checking, critical thinking, or brainstorming questioning. It is designed to be used in a live presentation, with real-time audience participation, though it needs to be prepared and embedded strategically beforehand. There are several enticing aspects to PollEverywhere. First, audience members can participate in answering questions via an online link or a randomly-generated text code. Second, PollEverywhere has greatly increased the types of questions and answer display options, now offering multiple-choice, open-ended, survey, word clouds (see Fig. 7 next page), rank ordering, emotion scales, numeric scales, and matrices. These poll questions can be shown directly from the PollEverywhere website, or each question

can be downloaded as a PowerPoint slide and saved as a part of a standard PowerPoint presentation. However, there are a few logistical considerations in deciding to use PollEverywhere. Thought must be given to the time participants will need to respond to questions in a live presentation, given that it is based on live Internet or cellular service. Further, if participants are texting in their answer, it is a two-step process: first, they must “join” the poll, by texting a unique numeric code and waiting for a response so that they can move to step two, which is texting that number back with their answer to the given question.

FIGURE 7. POLLING OPTIONS IN POLLEVERYWHERE



PollEverywhere results can appear in real-time directly from the poll’s website.

That process can stall a live presentation as audience members may enter the code incorrectly, not be able to see the code from where they are sitting, or not receive a response right away. When it works, it is impressive to see words or charts appear and update in real-time. However, when audience members are stuck, it can slow the flow of a presentation. Another consideration is that presenters need to be aware of approximately how many respondents they intend to have during each presentation. The higher education, free account allows users to create as many polls as they like; however, each poll can only accept and record 40 responses, otherwise an instructor version that could accommodate up to 400 responses cost \$349/semester.

## SECTION 2: DIGITAL TOOLS TO ALLOW FOR INTERACTION

This section will focus on a few tools that can be used to help foster interaction with and around educational content. Interaction is an important factor affecting educational success, especially in online learning environments (Tsui & Ki, 1996). For instance, studies have found students who report positive interactions with faculty are more likely to experience higher GPA and persistence levels, in addition to higher levels of satisfaction regarding their overall

academic experience (Kuh, Kinzie, Buckley, Bridges, & Hayek, 2006). As first put forth by Moore (1989), interaction is a three-dimensional construct which includes learner-to-content, learner-to-instructor, or learner-to-learner interaction. Learner-to-content interaction refers to a student's interactions with content that results in changes in understanding, perceptions, and cognitive structures (Moore, 1989). Learner-to-teacher interaction refers to all communications between the teacher and the student (Moore, 1989). It can also refer to the curriculum development methods an instructor uses to guide learning. Learner-to-learner interaction refers to the communication between learners and includes both the cognitive and social dimensions of the interaction (Moore, 1989). Moore's framework has been widely accepted in the literature and the importance of each of these various types of interaction on academic success has been well documented (Dennen, Darabi, & Smith, 2007; Burnett, 2007; Zimmerman, 2012).

## GOOGLE DOCS

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Google Docs is a free Web-based application from Google in which teachers and students alike can import, create, edit, update, and share documents in various styles and formats (.docx, .html, .txt, .rtf, .odt). Documents created with Google Docs are compatible with most word processor applications and can be accessed from just about any computer, tablet, or smart phone with an Internet connection, making it easy for anyone to create and share educational content. The document's author can also control who has access to the Google Doc via a sharable link and can also determine what level of access others can have to the document. Whereas anything that takes place in a learning management system is usually accessible to only those enrolled in the course, a Google Doc can be made accessible to whomever the instructor wants.

The document management benefits of Google Docs alone can save an instructor many headaches. How often has an instructor distributed a syllabus, only to discover an error or omission moments later? Google Docs allows an instructor to revise a work at any time without having to redistribute a second or third set. Because revisions made to a Google Doc automatically cascade to wherever its sharable link is used, instructors can make changes or updates to a document as needed.

Google Docs also lends itself to collaborative knowledge building, as its commenting and editing features allow students to work together synchronously or asynchronously. For example, by allowing students to comment and ask questions directly on the syllabus (a feature controlled by the permission settings), any confusion about course objectives or assignments can be addressed by the instructor or a knowledgeable student. Instead of getting flooded with emails from many students asking the same questions, general concerns can be asked and answered directly on the syllabus.

This approach to community knowledge construction can also be used to turn mundane reading assignments into collaborative reading experiences. In short, collaborative reading is a technique that encourages students to work together on a reading assignment to promote better comprehension (Klingner & Vaughn, 1999). While this is easily accomplished in face-to-face settings, the nature of online learning often isolates students from the teacher, as well from each other. By sharing a required course reading via Google Docs, the three types of interactions can be promoted. Not only can students reflect on the reading by offering their own commentary, they can also discuss divergent understandings. The instructor can also use this discourse to pinpoint systemic misunderstandings which can help shape the direction of the class.

## GOOGLE SLIDES

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Like Google Docs, Google Slides can help make course content more immersive and effective. While it appears to be nothing more than a PowerPoint equivalent, Google Slides is much more than a tool for delivering presentations - it is a powerful and easy-to-use tool for delivering interactive student experiences.

One of the most significant advantages of Google Slides is that it is easier to use and share than PowerPoint. Because it is cloud-based (as are the rest of the components of Google Suites), it does not need to be uploaded to a platform first, and updates/changes can be reflected immediately. This is an ideal feature for educators who may need to provide their students with presentations on a regular basis.

Google Slides can also be used for group projects and assignments that encourage students to interact and collaborate with their peers. For example, students can be asked to work together to create slideshows synthesizing various course topics or they can be asked to develop presentations that explore a particular subject matter. Students have the ability to add and edit slides simultaneously with their peers, generating a faster, more efficient way of completing a presentation. This solves the issue of several versions of the same presentation floating among collaborators, which may be a source of confusion and frustration. One of the fascinating aspects of Google's user interface for all of their Suite products is that it mimics the commands of the most widely used software for their paid counterparts, thus easing the transition of use between their products and office software giant Microsoft. This makes the instructors who are hesitant about trying new software more likely to integrate it into their classroom settings (which is often reported as one of the main reasons for resisting the acceptance of new technology by educators who may not be as tech-savvy as younger generations (Demetriadis et al., 2003).)

The finished presentation can then be downloaded in the Microsoft PowerPoint format for use without a network, or can be opened directly in Google Slides if Internet access is available. Once the presentation is over, those in the audience who wish to receive a copy can receive the link to a version that cannot be edited, and that they can access on their own time. If the link is provided with the ability for viewers to comment (before, during, or after the presentation), students are able to add their own thoughts and questions to the slides which can then be answered by either the presenters or other viewers. They only need to right click on the object they wish to comment on (be it image or text), click the "comment" choice on the drop down menu, and a text box with the commenter's Google profile will pop up, at which time they may add their questions, concerns, or encouragements. This collaborative capability allows not only for online learners to feel that their interactions are more concrete with their instructors and their peers, but for students who may have social anxiety, certain disabilities, or language barriers in which their writing ability is stronger than their speaking level, it gives a sense of comfort that they are not lost in the audience.

## GOOGLE FORMS

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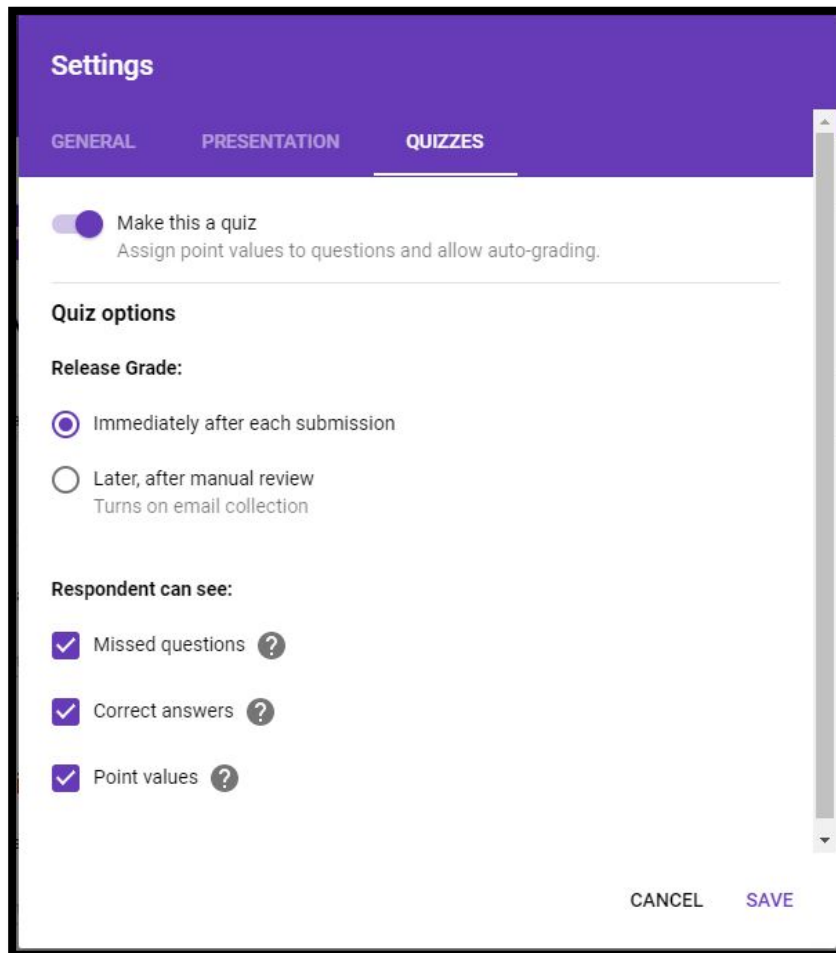
Google Forms is Google's answer to creating a direct path between the instructor and each individual student, providing an avenue for assessment, as well as streamlining certain procedural paperwork. While it will not get its own section here (as this chapter is designed specifically for tools used in collaborative learning), Google Sheets (the Microsoft Excel equivalent) is the backend where the answers and data received from Google Forms will be sent. It also gives the instructor the ability to receive an email each time a form is completed, therefore making it easier to keep track of where everyone is without having to sign into the platform itself.

With the ability to create each question in the format of short or long answers, multiple choice, checkboxes, drop down menus, or even image responses, Google Forms has a robust platform that can greatly enhance student

assessment in the educational environment. For example, it can be used to create a survey that asks for students' interests, weaknesses, strengths, and questions and concerns for the course he or she are about to take. This way instructors may be able to tailor the class in a more nuanced way if he or she finds a large portion of the student population is either lacking in an area or very interested in a particular topic.

Google Forms can also grade any tests that instructors create if they have close ended questions. The instructor clicks on the "Quizzes" tab, selects "Make This a Quiz," and provides the answer key that Google Forms will compare the students' results against (see Fig. 8).

FIGURE 8. SETTING THE QUIZ OPTION IN GOOGLE FORMS



Google Forms can allow any web-based survey to become a graded quiz.

These results, as mentioned before, will be placed into a Google Sheets spread for review by the instructor, but can also eventually be shown to the students if they are interested in the curve of a particular quiz or test.

An even more advanced setting is Google Forms' ability to add outside media content (such as a video from YouTube) in which a student can play the video directly in the form and answer any questions to measure the student's comprehension of the material provided.



Finally, it can be used to share ideas among students where all of the students' answers are aggregated and can then be provided via a shareable link from Google Sheets. This allows students to see each other's ideas in a collaborative environment with organized answers, and for teachers to sift through answers first in the event that a particular topic is sensitive or inappropriate answers are expected. While there is some debate about whether this application would be better in Docs, Slides, or Forms, the fact is that all three are capable in allowing students to interact with their classes in a way that is easy to use, efficient, and builds a stronger sense of community in the online learning environment.

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## GENERAL DISCUSSION

Collectively, the digital tools described above offer flexibility to meet an instructor's needs in the design, modality, and comprehension-checking aspects of creating course content and interactive experiences. These digital tools are all freely available and can be used with just a little experimentation, bringing students and professors into a more collaborative space both in and outside the classroom.

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# GOING MOBILE IN THE COLLEGE CLASSROOM

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## INTRODUCTION

The use of mobile devices (e.g. smartphones, tablets) is becoming ubiquitous and many people use their mobile devices to conduct their daily business without needing to actually enter the physical space of that business (e.g., online banking, shopping, information seeking). Mobile-first design is the act of creating the mobile experience for some electronic service prior to a desktop version. With more people having access to mobile devices, how might mobile devices and a mobile-first design be incorporated into higher education? This chapter will explore several strategies that faculty might use to effectively and meaningfully incorporate mobile devices into their classrooms.

E-learning is any effort to deliver and/or customize learning via an electronic medium (Rajasingham, 2011). E-learning strategies can be as simple as using PowerPoint slides during class or can be as complex as creating an online collaborative learning activity. With the advent of smart phones and other small yet powerful devices, a newer term is gaining momentum: mobile learning, or m-learning. Similar to e-learning, m-learning refers to any learning that is mediated through the use of a mobile device (Rajasingham, 2011). A mobile device is an electronic device that is portable, fits in a pocket or purse, is carried on a regular basis by its user, and allows for the use of high powered technology and Internet access from nearly any location (Rajasingham, 2011). Mobile devices are often the primary device used by people to access the Internet (Pew Research Center, 2015), prompting a “mobile-first” movement in many sectors of business that have an online presence. The “mobile-first” design movement simply refers to the notion that when designing an online presence, one must assume that most people will access this via their smartphone first. Webpages are designed and developed for the smaller screen of a mobile device and mobile applications are prompted for download when a user visits a business website from their smartphone. What might a mobile-first design mean for the classroom? Is it possible or desired to create learning experiences that are catered to the use of mobile devices? What are the possible benefits and challenges of leveraging mobile technologies within the learning environment whether this be face-to-face, blended, or online? This chapter will provide a number of different strategies that faculty might use to leverage mobile devices within their courses.

First, let us explore the question of why we might consider taking a “mobile-first” mentality when designing courses. Consider the reality of many of our learners today. Within our classrooms, the fact that nearly every student has a powerful Internet-connected device readily at hand is an awesome notion. Imagine if every classroom in a university was equipped with a one-to-one ratio of devices, each worth about \$500 (or more) each. Even in a smaller classroom of 20 students, this is like having a \$10,000 system installed in a small classroom. Scale this up to a large lecture hall and this might be a \$200,000 system. This has become a reality with the advent of smartphones and tablets. Not only is it likely that most students will possess a mobile device, but many students today use these devices as a primary communication device, mechanism for looking up information, and source of entertainment (Pew Research Center, 2015). Mobile phones are ingrained into daily life and faculty members likely possess a smartphone of their own, but some might be skeptical about allowing these devices to be used within the learning environment because of the distractive nature of these devices (ECAR, 2017). Some may outright ban devices in their classroom, but how might a faculty member begin to use these devices within their classroom? What if a student becomes bored and

drifts off when listening to long periods of a lecture (Langner & Eickhoff, 2013), perhaps checking in on e-mail or social media on their device? Enter in a “mobile-first” approach to course design. Designing learning experiences in a way that attempt to leverage the mobile device while also discouraging the possible distractions of the mobile device is arguably the approach that is necessary for faculty to take if they wish to create effective learning environments where mobile devices are used.

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## MOBILE-FIRST DESIGN IN THE FACE-TO-FACE CLASSROOM

One rather simple mobile-first strategy is to design each class period into a series of “mini-lectures” on the topics for the day rather than on one (or two) major topics. Shorter periods of information delivery (usually recommended 10 minutes or less) on specific topics broken up by periods of short activity can help students stay on task and be attentive (Halpern & Hakel, 2003), thus reducing the risk of students being tempted to escape into their smartphones. Deciding on the activity between these mini-lectures can then be a place to have students use their mobile device for learning purposes (see Stutts chapter). For example, an instructor might pose a series of questions to students on the content and have students respond using a student response system (SRS) from their phone rather than giving a paper and pencil quiz or having students raise their hands. There are a number of free applications that allow faculty to do this including PollEverywhere, Socratic, and Kahoot. Many faculty want in-class time to be interactive but may find it difficult to do so with larger enrollments (Mangram, Haddix, Ochanji, & Masinglia, 2015). SRS like these allow for all students in the classroom to be active participants in the question and answer session and provides the instructor with immediate performance information from all students who respond. When choosing to incorporate a SRS into a course, one must be sure to use the technology effectively. Designing effective questions takes planning as it is difficult to ask on-the-fly questions with some of these applications, but these systems allow faculty to easily see how many students understand the information and can allow for the instructor to clear up misconceptions or to adjust the lecture content to spend more or less time on a particular topic. (See Iwamoto & Hargis chapter.) Several of these SRS can also be used on a computer and the use of a smartphone is not necessarily needed. For those who are concerned about the opportunity for distraction from smartphones and computers, there are systems that require the use of a separate remote control device (such as TurningPoint) which avoids the possible distractions of smartphone use during class. However, these remote control systems must be purchased either by the institution or the student. Mobile applications like PollEverywhere, Socratic, and Kahoot are free to use but may provide the opportunity for students to use their device for other purposes, such as checking in on social media. One strategy to help students avoid this distraction is to require the devices be put away when there are no questions being asked. Additionally, shortening the length of the lecture into shorter segments should help decrease the temptation to escape into social media (Halpern & Hakel, 2003).

Some SRS systems are limited in the type of questions that can be asked (some only allow for multiple-choice questions) and sometimes a paid version is needed in order to record individual student data. Additionally, some systems do not integrate into PowerPoint or other presentation software requiring the use of two systems to deliver information and to host the question/answer sessions. Nearpod is an application that allows for instructors to create both content and activity slides that are presented on the students’ individual devices. Nearpod is specifically designed to work best on tablet devices, but work on any Internet connected device. Instructors can create PowerPoint-like slides to present content and then show an activity slide that requires all students to complete (e.g., quiz, polls, draw, post ideas). Nearpod saves all student responses and could be used by an instructor to award points for completing the activities. It also allows for the instructor to easily share student work anonymously to the class providing for teachable moments on the fly. Once again, though, care must be taken to design the class period

such that content is presented in short segments with interactive activity requiring student response to discourage students from using their devices for non-classroom activities.

Another technique for incorporating mobile devices into their classrooms is allowing students to use their devices to either look up some information or to contact someone they know to answer a question that the instructor may not know. For example, in a human biology course, a student may ask a question about a new treatment he or she heard about in the media for a major disorder. The instructor (a biologist) may not know the answer to this. But the instructor could ask if someone in the class could search for this information. Allowing students to use their devices for this specific purpose can be a powerful teachable moment and also keeps the focus of the use of the devices on classroom purposes. To design this activity in a way that helps avoid the potential for classroom disruption from the use of mobile phones to look up information, the instructor might call on a random student to report what he or she found and the source of that information. The uncertainty of whether or not one might be called upon can help encourage students to stay on task. Once some answers have been found, students can be instructed to put their devices away.

A final strategy that can be rather easily incorporated into the face-to-face classroom is the use of the mobile devices as a way of delivering an advanced organizer. An advanced organizer is used to introduce a topic to students in a way that is simple and connected to past knowledge (Woolfolk, 2016). For example, an advanced organizer might be sent prior to a lecture on the topic of positive and negative reinforcement providing an image or table of information for students to view prior to coming to class. This will provide the student advanced notification of the focus of the day's class and provides some overview information and maybe examples before they come to class. Thus, students come into class primed with the content for the day as well as a basic overview of the information. Many faculty are often willing to e-mail students to communicate. An advanced organizer could be as simple as sending an e-mail prior to class that day to prepare students for that day's class session. Taking a mobile-first mentality, the instructor should assume that the student will access this via his or her mobile device and the message should read well on a small screen. Creating a short e-mail with a bullet list of topics or a diagram that might read well on a small screen might help prepare students for the class period.

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## MOBILE-FIRST DESIGN CONSIDERATIONS WITH LEARNING MANAGEMENT SYSTEMS

Many faculty utilize their campus learning management system (LMS) for face-to-face or online courses and most LMS have a mobile version (see Cerniak chapter for a discussion of LSMs). Sending class messages like the previous example of an advanced organizer can be easily facilitated through one's LMS. Because students might access their LMS through a mobile device, when designing materials within a LMS, faculty must consider features such as ease of navigation, reading ease, and ability to submit assignments via the mobile site. Designing a course for the mobile version of the LMS can provide students with the ability to access and easily use course materials (e.g., readings, videos, websites) while on the go. A student having the ability to read or listen to the article for that day's class or even a pre-recording of a lecture while on his or her daily commute allows that student to productively use that time. Making these materials easy to read on a small screen and even making it possible for a screen reader to speak the text would need to be considered for consuming this information on a mobile device.

Making course materials easily usable in a multitude of formats (i.e., both text and audio) can make it possible for students to complete their readings while on the go, but there are disadvantages to this as well. It is not as easy for students to actively take notes while reading in this way. Students may be multi-tasking (i.e., driving while listening to the book reading for the day), which will likely result in less deep processing of the material, especially if the

reading or content is particularly difficult (Ruthruff, Johnston, & Remington, 2009). Therefore, even though it is possible to provide these affordances to the student, doing so does not guarantee that the student has deeply processed that information (see Littlefield and Gjertsen's chapter on working memory).

Considering the mobile capabilities of the LMS also means addressing the activities within the course. Instructors need to know if it is easy for students to submit or complete the course activities on a mobile device. Two of the most common forms of activities in an LMS are drop boxes for written assignments and discussion forums. Engaging in a discussion forum may be easier to complete on a mobile device than a written assignment. Discussion forums tend to be shorter written works and typing on the device's keyboard for this type of short activity is likely easier than trying to complete a short paper. The discussion forum may be video based (such as VoiceThread) which removes the need to type extensively on a small keyboard. Additionally, questions of whether the mobile device has the applications to complete longer written assignments must be considered. If a worksheet is in a particular file format (e.g., .docx, .pdf), then the device must be capable of not only being able to view that document, but to also alter that document. Because this may not be possible, it is unlikely that a course (even an online course) can go fully mobile. Most college courses still require some form of lengthy written work that is simply too difficult to do well on a small mobile device. Therefore, only some of the LMS activities within a course might be fully mobile and students in these courses will still need access to a "workhorse" device (i.e. laptop or desktop computer) to complete all activities in the course.

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#### MOBILE-FIRST DESIGN IN INSTRUCTOR-STUDENT COMMUNICATION

Arguably, one of the most important elements of any course is effective and efficient interaction between the instructor and student both in and out of the classroom (Chickering & Gamson, 1987). Another consideration of mobile-first design in the classroom is using alternative communication platforms to interact and communicate electronically with students. Though most students and faculty still use e-mail as their primary mode of electronic communication with one another, there are other communication applications that make use of some of the unique features of mobile devices (i.e., push notifications). A push notification is an alert that is given on a device any time a new message is available. Most people likely turn off any push notifications on their e-mail simply because having this on would result in a new tone every few minutes. However, users often leave push notification on for applications such as a messaging or chat programs. It might be important for certain messages that are sent to students to have a push notification. For example, in the previous discussion about advance organizers, a student who receives this message via e-mail may not check their e-mail prior to class, thus making this advanced organizer less effective and misses the purpose of the message. But if this message was sent via text, then the student may be more likely to check this message prior to class because he or she will receive a push notification of that message.

There are a number of tools that could be used to change the mode of electronic notifications. Several LMS have a newsfeed or course announcement feature that might have notifications associated with it if the student has the mobile version of the LMS on their device. This is an easy and integrated way to send an entire class a message, but it is generally just one-way communication (instructor to student). Other communication applications can allow for two-way communication. Texting is probably the easiest example. There are programs that allow individuals to send bulk text messages without actually having to share phone numbers (e.g. Cell.y, Remind.com). Programs such as Slack provide yet another avenue for communication between people and keep a Twitter-like feed of the conversations and allow for attachments more easily than text messages. When considering these alternative modes of communication, the important question to answer is how important is it for students to check and read this

message quickly after receiving it. If this is not a priority, then a messaging tool with a push notification is likely not important and adding a superfluous electronic tool into the classroom.

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## GOING FULLY MOBILE IN LEARNING

Up to this point, I have discussed methods of incorporating a “mobile-first” mentality in course design without actually assuming the course being delivered entirely in a mobile format. The impediments to doing certain types of academic activities exclusively on a mobile device challenge even the most creative faculty, although elements of these courses may be used on a mobile device, the entire course is not something that could be effectively conducted on a mobile device. Additionally, faculty may not have the knowledge or skills necessary to actually create mobile environments and applications themselves. Some highly innovative and motivated faculty may be interested in creating fully online and fully mobile courses. A fully mobile course would likely contain materials that are inherently interactive and adaptive to individual learners and where classroom activities can be easily completed on one’s smartphone. Gone might be the traditional term paper, an activity extremely difficult or near impossible to conduct exclusively on a smartphone. Instead, alternative activities such as the creation of videos might be included.

Some faculty may also find that existing electronic materials and services are insufficient in their desire to go completely mobile and may have the resources and skill to develop mobile applications themselves. They may create specific games appropriate to the course that provide not only motivation but also deep learning. They may create their own e-books with the text, images, and interactive activities they wish. They may create interactive and dynamic websites that are responsive to mobile devices. Some of these initiatives might be easier than we think. For example, there are e-book building applications that are relatively easy to use (iBooks Author as an example). The challenge here for faculty includes the time, resources, and skills to carry these major projects out. Therefore, converting an entire course to be delivered via a mobile device is a daunting task and likely to be riddled with setbacks.

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## CONCLUSION

This chapter focused on mobile-first design as it might apply to education. In this chapter, I have discussed what it might mean to use a mobile-first design mentality within the educational environment. A mobile-first mentality requires the faculty member to design learning environments, materials, and activities for use on the student’s smartphone or tablet. A variety of strategies for taking a mobile-first approach have been offered, but again converting a course in to an exclusively mobile experience is unlikely to occur without extensive faculty time and resources, so instead instructors can attempt to incorporate some elements of mobile-first design into their courses. Mobile devices are truly changing the fabric of not only our educational environments, but also in how we conduct our business and everyday communications and these devices afford opportunities for interactivity and personalization that are worth exploring.

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# INTEGRATING ACADEMIC SKILLS AND DIGITAL LITERACY TRAINING

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## INTRODUCTION

As each new semester approaches, college professors thoughtfully prepare courses and plan dynamic lectures, engaging class activities, and challenging assignments. It is common practice to assign work to be done electronically and submitted online, yet in doing so we may never question students' proficiency in technology – a logical response when, in a typical class, nearly all students have a laptop in front of them. Have instructors considered *how* students use technology in courses? If you assess students' knowledge or critical thinking skills at the start of your course, why not also consider evaluating students' digital literacy skills? This may be a critical gap in students' skill sets, one that is exacerbated by misconceptions about digital literacy skills. In this chapter, we share a cross-disciplinary perspective to integrate digital literacy and academic skills training and encourage instructors to consider how digital skills can be implemented in your courses.

Millennial students have been labeled “digital natives.” Because students have grown up with technology, many assume they have become fluent as a natural consequence of this exposure (e.g., Prensky, 2001, 2006). Digital natives are considered eager to use new technologies and quickly able to adapt to them. They also are deemed to be excellent “multitaskers” who can effectively manage multiple activities simultaneously and are facilitated in this enhanced efficiency by their technological savvy. Unfortunately, the assumption that students have gained digital expertise by mere exposure constitutes an urban myth that is inaccurate and potentially harmful to teaching and learning. Subscribing to this belief overestimates students' skills and abilities, which may adversely impact what students learn.

## THE TRUTH ABOUT DIGITAL NATIVES

There is no evidence that “digital natives” easily adapt to and integrate new technologies; in fact, university students' actual use of technology has been found to be quite limited in range (Kirschner & De Bruyckere, 2017; Kirschner & van Merriënboer, 2013; Margaryan, Littlejohn, & Vojt, 2011). Students underestimate the detrimental effects of multitasking (Brasel & Gips, 2011). Multitasking in class negatively impacts students' own performance and has detrimental effects on other students who become distracted, much like the effects of secondhand smoke on non-smokers (Kirschner & De Bruyckere, 2017; Sana, Weston, & Cepeda, 2013; Ward, Duke, Gneezy, & Bos, 2017). In response to the growing body of research showing technology increases distraction and impairs performance, some instructors implement “technology bans” in their classes (Dynarski, 2017; Rosenblum, 2017).

Nevertheless, technology is deeply integrated into students' lives and learning environments, and taking even firmer root. As one example, [Ohio State University recently announced a partnership with Apple](#) to become a “Digital Flagship” University (Davey, 2017). Through this partnership, all incoming students will receive iPads, keyboards and Apple pencils, and a core set of applications. The stated goal is “integrating learning technology throughout the university experience” (Davey, 2017). The initiative aims to integrate common tools and learning technologies in all aspects of students' experiences, including classrooms.

While this is a new and unique initiative, it points to the fact that educators have an opportunity to consider the role of technology in student learning. Rather than banning technology altogether, faculty can consider digital skills as a learning objective. Banning technology, while well-intended, is impractical, and unlikely to change students' use of technology outside the classroom. It also does not help students build skills in the long term. Technology bans may, in fact, negatively impact students in other ways, such as their engagement in the class or rapport with their instructor (Hutcheon, 2017).

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#### THE IMPORTANCE OF FOCUSING ON SKILLS

The reality is that technology is becoming more highly integrated into all aspects of students' lives; it is not going away. By addressing digital skills, we have an opportunity to help students build the critical skills they need to be successful in their college career and, ultimately, in the workplace (c.f., Strohmetz et al., 2015). The APA Guidelines for the Undergraduate Major explicitly emphasize interpersonal skills, written and oral communication skills, and "professional skills" – including self-efficacy and self-regulation skills, project-management skills, and teamwork skills (American Psychological Association, 2013). Digital skills are an increasingly important part of any professional skill set, relevant in any field. Technological literacy is critical to enhancing the professional skills employers seek in new employees. The National Association of Colleges and Employers Job Outlook Survey (NACE, 2016) identifies the skills employers consider most important when evaluating job applicants; the top skills mentioned by employers are listed in Table 1.

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**TABLE 1. NATIONAL ASSOCIATION OF COLLEGES AND EMPLOYERS (NACE) TOP ATTRIBUTES EMPLOYERS SEEK IN JOB CANDIDATES**

Leadership	80.1%
Ability to work in a team	78.9%
Communication skills (written)	70.2%
Problem-solving skills	70.2%
Communication skills (verbal)	68.9%
Strong work ethic	68.9%
Initiative	65.8%
Analytical/quantitative skills	62.7%
Flexibility/adaptability	60.9%
Technical skills	59.6%
Interpersonal skills (relates well to others)	58.4%
Computer skills	55.3%
Detail-oriented	52.8%
Organizational ability	48.4%
Friendly/outgoing personality	35.4%
Strategic planning skills	26.7%
Creativity	23.6%
Tactfulness	20.5%
Entrepreneurial skills/risk-taker	18.6%

Digital skills are inherently important to students' future jobs. The same students who might be underutilizing (or misusing) technology in our classrooms today will soon be in internships, meetings, job trainings, or press conferences where the stakes will be higher than their score on an exam.

An approach that integrates digital skill development is not only consistent with a skills-based perspective, but technology is most attractive to students when it is meaningfully integrated into a curriculum (Lengel & Lengel,

2006). For example, Kraft and Seely (2015) studied the impact of integrating mobile technology (iPads) into a journalism course. They provided students with iPads, applications, and training to use the device for assignments in the course – doing research, interviewing, taking notes and writing news stories, shooting photos, recording video and audio, and using social media. Because students were working in the same platform using the same tools, the instructors were better able to embed training into assignments. Training on the technology became an integral part of the course experience; students who received training produced higher quality work.

Beyond individual classes, many institutions have developed initiatives to integrate technology into students' experiences. An increasing number of college athletics programs have mobile technology programs to support the unique needs of college athletes. [Penn State University's Mobile Technology Program](#), for example, provides student-athletes iPads along with training and support, as does the [University of Cincinnati](#), Texas Tech, and Ohio State. Student-athletes can use this technology to manage their academic as well as their athletic commitments and programs can deploy training and resources to all student athletes fairly and efficiently. Yet, we wondered, how do they actually use their devices?

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### EXPLORING STUDENTS' TECHNOLOGY USE: ATHLETES AND IPADS

The population of student-athletes at Ohio State afforded us an opportunity to explore how students were using the technology provided to them, and how effectively they were leveraging it for academic purposes. All student-athletes received the same technology (the iPad itself, four applications for academics, four relevant to their sports, and the university app) but no training was provided on how to use the device. We considered this an ideal opportunity to investigate how student-athletes spontaneously used their devices for academics. We conducted an anonymous survey of Ohio State student-athletes in January of 2016. All student athletes (N = 969) received a copy of the electronic survey and 178 responded (18% response rate). This pilot study was a first attempt to explore how student-athletes were leveraging their technology for academic purposes and what, if any, barriers they experienced in doing so. Highlights from the survey results include:

- Most of the respondents (81.6%) had not used an iPad for academic purposes before arriving at Ohio State.
- When asked how much time they used their iPads during a typical week, 71% reported using their iPads four hours or less.
- When asked how they used their iPads, student-athletes' most frequently-mentioned activities were email (82%), homework (72%) reading (67%), watching movies (65%), watching online course videos/lectures (55%), social media (55%), taking notes in class (51%), listening to music, 50%, taking photos (21%), and writing assignments (18%).
- Student-athletes were most likely to report using their iPads to "take notes in class," with 24% identifying this activity as the one way they were most likely to use their device, followed by "homework" (16%) and watching movies (14%).
- When asked to identify the top three Apps they use most often, specific applications most frequently mentioned were Safari (22%), email (20%), and Netflix (13%).
- When using their device for note-taking, students indicated they were using the basic Notes app (8%).
- When doing academic work, students indicated that when given a preference, 67% preferred to work on a laptop, with only 14% preferring to work on an iPad or tablet.

Although preliminary and not generalizable to all college students, these results suggested to us that student athletes were underutilizing their technology for academic purposes, with the majority of respondents using their devices for academics only a few hours each week – including their use for entertainment. Use of applications to organize their work or collaborate (two important areas for skill development) were limited in this sample, and most students who used the iPad for note-taking were using the most basic applications (e.g., Safari, email) in a limited

way. In fact, follow-up meetings with athletes revealed that when they did use the device for note-taking, they typically used the basic Notes app and transcribed lecture notes. Most had not explored other applications that offer more enhanced features for note taking – for example, applications that allow users to integrate notes with pictures, video, or other media, such as Notability or Evernote. Even with the limitations of these data, we found the implications provocative.

As teachers who value skill development, we saw this as an opportunity to enhance student athletes' digital literacy skills for their immediate academic benefit as well as for their long term professional development. Working in partnership with Ohio State's Student Athlete Academic Support Services (SASSO), we collaborated on a series of trainings for student-athletes that embedded activities to learn how to use various applications relevant to academic skills, and integrated information to raise awareness about the science of learning and effective study skills and strategies. Initially, workshops employed an iTunes U course – free to set up and free for students to enroll in. After our campus conversion to a new learning management system (LMS), the training was integrated into a Canvas course shell, and we also practiced how to use the iPad in Canvas to submit assignments. Building on lessons learned from Kraft and Seely (2015), we collaborated with Ohio State Athletics so that student athletes received keyboards and protective cases for their devices, and also provided a set of key applications that focused on specific digital literacy skills. Students were given a tutorial and an opportunity to practice using the following applications. Modules for the class included:

- An introduction to the iPad, framing the device as an “academic partner” that was uniquely useful for academic tasks such as organization, communication, and integrating class information.
- Information about the “digital native” myth and why students benefit from learning technology like any other subject.
- How to effectively use the iPad in class, including information on the science of learning: The “learning style” myth, how multitasking can be harmful, and how dual coding (e.g., combining images or pictures with words) can enhance retrieval. Students practiced taking notes in ways that integrated video and images, not just transcribing text.
- How to use the iPad at home to organize documents by scanning them via applications like CamScanner, how to use cloud storage, and how to use various word processing applications as well as how to submit them via a course LMS.
- How to use the iPad on the road, including applications that would allow them to collaborate using tools such as Google Docs, as well as tools to meet/connect remotely with peers or professors (e.g., FaceTime, Skype, or Zoom) when travelling for their sport.
- How to work with faculty and tutors, including applications like Explain Everything, an interactive whiteboard that would allow students to record a tutoring session or visit to an instructor's office hours for review while studying or travelling for their sport.

A pilot group of 13 student-athletes participated in workshops in March and April 2016. Following the training, students were unanimous that the training was relevant and useful to their academic life, that they had a better understanding of how to use the iPad academically, and that they were more confident using the iPad academically than before the workshops. Although student-athletes expressed a preference for doing academic work using a laptop (57%), 29% of the pilot group indicated they now preferred working on their iPad. More compelling were the comments from student-athletes who participated in the workshops, who hoped for more information and support from their faculty on options for using technology effectively, both in class and for assignments.

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## LEVELING UP: INTEGRATING DIGITAL SKILLS INTO YOUR COURSES

Based on our experience, we suggest instructors consider the technology students may be using in your courses and how to support high-quality work by enhancing their digital skills. Start by reviewing your course assignments. What are the opportunities to integrate technology and enhance students' skills? In courses where the assignments are primarily exams, essays, or research papers that only the instructor or TA will read, it may be difficult to see how technology plays a role. However, instead of requiring such "disposable" assignments, consider opportunities for coursework that builds skills and holds more meaning for students (Jhangiani, 2016). Some possibilities may be:

- Hold a digital poster session, by having students create and comment on one another's work – such as [this example, using the online discussion board](#).
- Have students submit video assignments, which they edit and caption to share with their classmates (c.f., King, 2018, Bell, 2018).
- Have students annotate research articles using ExplainEverything, or create animations or gifs to explain key findings to share with other students or members of a group project – [see one example shared on Twitter](#) (Sievers, 2017).
- Assign students to create a podcast – ask them to conduct an interview or write/edit and record a script (Neufeld & Landrum, 2018).

These assignments help students apply what they are learning and differentiate themselves when applying for jobs or graduate programs. Students will benefit most from these tasks with training and support.

Reflecting on our experiences in working with students and integrating technology in our courses, we recommend you consider one or more of the following:

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### CHECK YOUR ASSUMPTIONS ABOUT STUDENTS

Having a device does not equate to having skills. As one example, one of us knows of a student taking an online course who was asked to make a chart and submit the assignment in a PDF format. The student wrote out the answers to the assignment by hand on paper, took a picture of it, and then saved the picture (.jpg) as a PDF. Although the student technically met the requirement of the assignment, the student was clearly under skilled and could have identified a more efficient way to submit the assignment that would be more effective in the long run. Consider assessing students' digital skills at the start of your course to ensure they know how to use the tools you expect them to use in your course, and offer assistance for those who need it.

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### TALK WITH YOUR STUDENTS ABOUT THE RESEARCH ON ATTENTION AND MULTITASKING, AND ABOUT THE RESEARCH ON HOW STUDENTS LEARN

Knowing how to use technology effectively – and how to avoid behaviors that can potentially negatively impact learning – will benefit students long after they leave our classes. Share research on effective learning strategies with students (see for example <http://www.learningscientists.org/>), as well as the research that shows the detrimental effects of technology on learning (e.g., Sana, Weston, & Cepeda, 2013; Mueller & Oppenheimer, 2014; Ward et al., 2017). You might even review this research with students when considering your own course policies regarding technology use – or better yet, let students contribute to course policies around the use of technology in the classroom once they are aware of the research. A potential assignment might be for students to create a video recommending effective strategies for using technology for their peers.

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### SET ASIDE TIME IN YOUR COURSE TO WORK ON SKILL DEVELOPMENT

Consider what skills students have the potential to gain in your course – not just the knowledge and facts they will learn – and be sure that you are carving out time in your class to work on building those skills. It is not difficult to imagine that you might need to set aside time in a statistics class to review how to use a particular data analysis software. Consider setting aside time in a class to review how student groups can effectively use Google Docs or other tools to collaborate. This may entail making an online module available to students that provides support if they are under skilled in this area. Demonstrate how to use video conferencing tools so students can collaborate remotely. If you need to “skill up” yourself, seek out collaborations with other faculty members at your institution who use such tools, and ask them to share their strategies for training and supporting students. Alternatively, seek out your campus educational technology specialists to assist you.

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### ASSESS STUDENTS’ DIGITAL SKILLS AS PART OF WHAT STUDENTS SHOULD KNOW AND BE ABLE TO DO AT THE END OF YOUR COURSE

Students value what is assessed in a course. If a particular skill set is important, put it on your syllabus. Assess students’ “grade of execution” on your assignment rubrics to give feedback on how students executed their assignment and used technology. With the exception of software that is unique to a particular course (for example, SPSS, R, or other data analysis software, or online software required with an eBook), instructors rarely take time to review technology with students – we may assume that it is something students should come “pre-loaded” with, or that it is someone else’s responsibility to teach them the tools. But where precisely in a student’s academic career will this happen? In introductory level courses in particular, instructors are often on the front lines in terms of helping students build literacy with their campus technology, but in more advanced courses, showing students tools that will benefit them in their professional lives is a worthwhile investment of time. Review tools in class, when reviewing the details of an assignment, or make/post videos for students to highlight key features or stumbling blocks. Better yet, engage students to make videos for future students.

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### GIVE STUDENTS AN OPPORTUNITY TO EXPLORE TECHNOLOGY THEMSELVES AND SHARE WITH YOU HOW THEY USE IT

Consider creating an assignment that asks students to explore a new technology for collaboration (Google Docs, Office 365, Box, Huddle), communication (Zoom, Slack, Explain Everything), presentations (Prezi, SlideDog, Google Slides) data analysis (Excel, R, JASP), or organization (Evernote, Trello, Wunderlist, Todoist). Have students practice using the tools and report back on strengths and weaknesses. They get the benefit of trying new tools, and you can learn about them too!

Technology in education is here to stay. To prepare our students for their futures, use this opportunity. Let us work with students on more than just the content of lectures and help them to be productive and effective, as well as knowledgeable. The idea of the “digital native” is a myth, but the opportunity we have is very real.

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# MOVING READING AND STUDYING TO THE SCREEN: A DISCUSSION OF E-BOOKS AND ONLINE STUDY TOOLS

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## INTRODUCTION

In this digital age, students can access and read more textbooks online than ever before. E-books are an emerging technology, and come in many forms. For instance, some e-books are downloadable while others are only accessible over the Internet. They may be free or only purchasable through publishers' digital libraries. In addition, app stores provide a practically endless supply of online study tools, such as flashcards and quiz programs, which are sometimes paired as useful resources with specific e-books.

Though students have all of these resources at their fingertips, traditional, paper course materials remain advantageous in some ways for learners, such as by having an appealing tactile sensation for learners and not being prone to technological issues like Wi-Fi access or download speeds. The digital world has benefits, such as its inherent convenience, but there remains something special about paper for learners. That said, e-books are quickly becoming more available on the market and typically offer a cheaper alternative for students. Thus, educators must become more familiar with their use.

The following chapter will provide a discussion of the advantages and disadvantages of e-books, in addition to a comparison of e-books to print books. Key considerations to make when designing and adopting e-books will also be highlighted.

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## DEFINING E-BOOKS AND CURRENT TRENDS

The definition of an e-book is somewhat variable. Most typically, e-books are defined as "texts that are digital and accessed via electronic screens" (Rockinson-Szapkiw, Courduff, Carter, & Bennett, 2013, p. 260). A definition is not as simple as saying an e-book is "an electronic version of a printed book" (as defined by the Oxford dictionary), as many e-books are not available in print. E-books are designed to be read on a multitude of electronic devices, such as laptops and e-readers like Kindles. These devices can be used in stationary or mobile locations.

In recent years, students' use of e-books and technology has increased. In the 2014 ECAR study of undergraduate students and information technology, 213 institutions of higher education and ~75,000 students shared information on their use of technology in education (Dahlstrom & Bichsel, 2014). Approximately 60% of students reported using an e-book in at least one course. Students also had a vast array of technology at their fingertips. More than 80% of students owned laptops and smartphones, a little less than 50% of students owned tablets, and just below 25% of students owned e-readers. All of these percentages were on the rise from prior years' data and were expected to continue to rise in subsequent years. In a later article, deNoyelles, Raible, and Seilhamer (2015) clarified that e-book users had increased ~18% over the prior two years.

E-books are progressively becoming more familiar and accessible for college students. Additionally, some universities even require students have e-books, with no print books available (Osborne, 2012). Given that primary and secondary schools are more often incorporating tablets or similar devices into their learning activities and finding positive outcomes (see Haßler, Major, & Hennessy, 2016, for a review), students will increasingly already be familiar with using such devices for educational purposes when they enter college. Thus, a thorough discussion of the pros and cons of this emerging technology for college students is merited.

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#### WHAT ARE ADVANTAGES TO USING E-BOOKS FOR LEARNING?

E-books come in many flavors. Some are interactive and provide unique traits that go beyond what a print book can offer. Smyth and Carlin (2012) surveyed university students, finding that advantages of e-books were convenience (30%), remote access (20%), flexibility (20%), searchability (14%), cost (4%), choice (3%), and environmental incentives (2%). Lim and Hew (2014) pointed out that e-books can also provide students with interactive experiences, such as sharing content with others, and can thus be more engaging for students than print textbooks.

In a similar vein, Nie, Armellini, Witthaus and Barklamb (2011) provided students with e-book readers preloaded with course materials. Students' learning was enhanced, with potential reasons being the more adaptable presentation of material, flexible timing, use of new reading strategies, and cheaper cost. Ji, Michaels, and Waterman (2014) also reported that students viewed cost as an overwhelming advantage to electronic resources.

E-readers can also be easier to use than print books. For instance, Kiriakova, Okamoto, Zubarev, and Gross (2010) reported that students found that e-book pages could be bookmarked and turned easily. Students also stated that the search-and-find feature was a helpful tool. They viewed e-readers as portable and convenient, and mentioned a "coolness factor" to e-books (p.22). Similarly, Jang, Yi, and Shin (2016) reported that digital textbooks may enhance student motivation, as they are the more exciting option for learners, perhaps because they are so new with unique features.

According to Herson, Hopper, Leach, Saunders, and Zhang (2007, as cited in Lim & Hew, 2014), some key perks of e-books are (once again) cost and general convenience, such as searching for key terms and copy/pasting out portions of text. Lam, Lam, Lam, and McNaught (2009) further suggested that e-books are inherently portable and can optimize reading time since students can read on the go, such as during a break between classes. Given that paper books can also be heavy and cause orthopedic damage (Talbot, Bhattacharya, Davis, Shukla, & Levin, 2009), the lightweight nature of e-books may be another incentive.

An interesting piece of research also reported that students who embrace new technologies like e-books may perceive themselves as more capable learners (Johnson, 2016). Similarly, Rockinson-Szapkiw and colleagues (2013)

found higher levels of affective and psychomotor learning in students opting for e-books for their education courses over print books. Perhaps the readiness and confidence to engage with e-books reflects something inherent about the learner's personality or work ethic.

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#### WHAT ARE DISADVANTAGES TO USING E-BOOKS FOR LEARNING?

Though e-books have some potential benefits for learners, there are also possible downsides. Smyth and Carlin (2012) surveyed students regarding what they viewed as primary disadvantages of e-books. Students reported a general preference for paper (38%), reading online text as challenging (38%), issues with access (13%), distractions like social media (9%), difficult navigation (8%), lack of choice (7%), and cost (4%). Regarding distraction, students may find it difficult to reserve their computer time for the sole purpose of studying; other forms of computer entertainment often interfere. Lim and Hew (2014) also commented that students may feel unfamiliar with the technology (reporting that the digital interface was overwhelming and/or did not match their learning style). Students may also have a low patience threshold for technology issues like upload speeds and Internet reliability, given that these problems may or may not resolve in a timely manner, and paper books may act as permanent solutions.

Reading from e-books can also strain one's eyes. Polonen, Jarvenpaa, and Hakkinen (2012) investigated adults' reading from e-books versus print books. When using near-to-eye displays, eyestrain and sickness symptoms were relatively frequent. Reading from print copies was simply more comfortable for users, perhaps especially over the long-term. Supian (2011, as cited in Lim & Hew, 2014) agreed, writing that "smart phones are good for bite-sized reads, but painful for long, sustained periods of reading" (p.1). Possible reasons for why the e-books may have induced such symptoms include low screen resolution, brightness/glare, and text layout.

There may also be a decrement to students' learning, or at least their perception of their own learning. In Ji et al.'s (2014) study, students reported reading and learning more content from print readings. Perhaps as a direct result, many students opted to print out at least some of their readings that were only available in electronic form. Agreeably, Chang and Ley (2006) found that ~2/3 of their participants printed out 75-100% of their electronic materials for class, and 76% of students often or almost always used hard copy materials for studying. Similarly, Ji et al. (2014) found that ~65% of students in their research had done the same. Thus, though the initial cost of e-books might be lower, students may be spending a significant amount of additional money on printing fees. Further, there may be an opportunity cost to consider; time that could have been spent reading is now spent on printing the reading.

The ability to cut/paste text from e-books may also contribute to plagiarism. Smyth and Carlin (2012) did note that some respondents reported this potential activity as a disadvantage of e-books. Thus, teachers might consider giving additional reminders about plagiarism and schools might be inclined to purchase software to specifically check student papers for such occurrences.

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#### COMPARING E-BOOKS TO PRINT BOOKS

Despite being in the digital age, students often have a distinct preference for paper books over e-books. One Canadian study showed that ~83% of college students preferred print over digital materials (Kaznowska, Rogers, & Usher, 2011). In their research with graduate students in the U.S., Chang and Ley (2006) also reported that ~2/3 of students preferred printed materials, 27% had no preference, and only 9% preferred material on the screen. These

students were distance and hybrid learners (taking classes all or partially online), so it is possible that they engaged with printed materials as one way to reduce the cognitive load felt from their already frequent use of the screen.

Students may regulate themselves less well when using a digital medium relative to a printed book (Ackerman & Goldsmith, 2011). As mentioned previously, distractions can mount when on an electronic platform. Students have reported preferring print books for the pleasure and ease of reading (Smyth & Carlin, 2012).

Similarly, Spencer (2006) surveyed distance learners, finding that they preferred printed materials for portability, flexibility, dependability, and less eye fatigue. Students also reported generally enjoying the feel and permanence of paper. Prechel, Eshet-Alkalai and Alberton (2009) have reported that students believe that print materials contribute more to their learning than electronic materials. Though more than half of their students preferred using both the print and digital textbook to some degree, ~37% preferred the print version only while a small ~5% preferred the digital textbook only. Students liked the convenience and accessibility of the print book in addition to the simplicity of finding information. Top reasons influencing their responses included difficulty in reading long passages of text on the screen, familiarity with printed books, searchability, and being unable to directly write on digital copies.

Whether or not a student opts for an e-book may depend on the type of reading. For instance, Lamothe (2010) reported that students preferred online resources for reference material but paper versions for complete books. However, other researchers have suggested that students may use paper books more effectively for finding information than e-books, perhaps due to students' familiarity and confidence with print books (Berg, Hoffman, & Dawson, 2010). In this research, students also seemed to use print books more linearly, reading them straight through, while e-books were used more non-linearly, such as browsing or skipping around the text. Students' tactile sensations can also aid in locating information (e.g., marking pages with fingertips, flipping through pages). The feeling of the weight of pages can be a cue to progress (Wilson, Landoni, & Gibbs, 2003). Advancing through pages and judging progress may simply be more burdensome in an e-book.

Though there seems to be a general preference for print, numerous researchers have reported no difference in achievement or learning between e-book and print readers (e.g., Annand, 2008; Connell, Bayliss, & Farmer, 2012; Murray & Perez, 2011; Rockinson-Szapkiw et al., 2013; Young, 2014). Other researchers have reported some differences on related measures. For instance, though Daniel and Woody (2013) reported no difference in learning, students took longer to read text on the screen than when in print (perhaps due to multi-tasking), with a stronger effect noted when reading at home. Other researchers have confirmed longer reading times on electronic devices relative to paper, though the difference tends to be minimal (Connell et al., 2012; Kang, Wang, & Lin, 2009). If students believe reading from the screen is slower and less accurate, they may develop a belief that print books lead to better comprehension (e.g., Garland & Noyes, 2004). Agreeably, Ji et al. (2014) reported that students reported studying and learning more from print materials.

For the small percentage of students who do prefer e-books over paper textbooks, the unique characteristics of e-books tend to be attractive. For instance, Prechel et al. (2009) reported that students appreciated speedy access to online examples, embedded links, and the straightforward navigation system.

Interestingly, cost has been reported as both a pro and con of e-books. Perhaps this dichotomy relates to the fact that used print books are also available, in addition to options for renting books. Print books can also often be sold back to the bookstore or to another student, which recoups some of the initial cost. Additionally, if students need to buy the technology platform on which to read the book, such as an e-reader, this purchase can be quite expensive

(though it is, hopefully, a one-time cost). That said, rising costs in college are of paramount concern to most students, so, if e-books can reduce the cost of textbooks overall, they deserve our attention.

It seems then that students may not currently view e-books as suitable substitutes for print books. But, this status may be changing. Ismail and Zainab (2005) reported that users' previous experience with e-books lowers their preference for print books, though this difference was trivial. It can also be noted that, at this current point in time, students likely used mostly paper books in their primary and secondary schools. But, as technology in the younger classrooms becomes more commonplace, perhaps e-books will also become more familiar to students. Students also may not be aware of the unique features of e-books, or, if they are aware, they may not use them (Ackerman & Goldsmith, 2011; Chen, 2012). Thus, as familiarity and popularity of e-books increases, perhaps e-books will also be more accepted by students as viable learning platforms. Moving forward, key goals include making e-books more approachable for students and highlighting the distinctive benefits of e-books.

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## FACTORS TO CONSIDER WHEN DESIGNING AND ADOPTING E-BOOKS

One factor to consider when a teacher recommends an e-book or a student opts to purchase an e-book is screen size. Recent literature has investigated the effects of smaller screens in education, such as tablets and smartphones. Kim and Kim (2010) reported that smaller screen sizes can present difficulties for vocabulary learners; they may induce extraneous cognitive load due to features like font size or added glare. Similarly, Reeves, Lang, Kim, and Tatar (1999) found that humans' attention is enhanced by media messages on larger screens. That said, smaller screens do have promise, perhaps especially given that each new model of smartphone or tablet seems to have enhanced resolution and traits such as reduced glare.

Students are using many different devices for e-reading. Smyth and Carlin (2012) reported that 68% of students use a laptop or PC for e-books, followed by 21% smartphone, 9% e-book reader, and 1% tablet computer. Connell et al. (2012) reported that participants found iPads more usable than e-book readers, perhaps given their enhanced functionality. Zeng, Bai, Xu, and He (2016) compared four different devices for e-reading – laptop, tablet (iPad), e-reader (Kindle), and smartphone (iPhone). They also had students read a chapter in static .pdf format or more dynamic .epub format. Students read the .epub chapter file more quickly than the .pdf file, and the three handheld devices resulted in enhanced reading comprehension for the .epub files. One possible reason is that .epub files automatically adjust content to fit the screen size. The .pdf content may have been quite small on those same screens. Thus, for students using e-readers and smaller screens like phones, fluid format files like .epub files may be optimal for displaying content.

Characteristics of the user may also affect students' choice to use, and opinions of, e-books. Age may be one factor. Chang and Ley (2006) reported that older learners (36 years+) were more likely to use print materials than younger learners. There was a relatively stark linear trend in print materials by age, as older learners were compared to the 26-35 age group and the traditional college-age student of less than 26 years. Availability of technology may also be an issue. Annand (2008) reported that some students found it difficult to gain access to a shared computer for enough time to complete their reading or reported that their computer was in a distraction-filled location. The special needs of the learner may also come into play. Though many publishers include aspects like text resizing that are helpful for learners with special needs, others do not (Mune & Agee, 2016). McNaught and Alexandra (2014, as cited in Mune & Agee, 2016) provided a list of key features for accessibility in e-books, including screen reader compatibility, screen magnifiers, text-to-speech programs, customizable backgrounds, and alternative text for visuals.

A well-structured design is of utmost importance for an e-book. Based on student reports, Wilson et al. (2003) recommend incorporating search features, embedded links, and interactive opportunities into e-books. They also promote using a sensible line length (similar to the length of a printed page), reducing the need for scrolling, including some marker of reader progress, utilizing visually appealing images to capture attention, recruiting comfortably-sized fonts, offering short chunks of text to improve scanning, and providing students with bookmarking/highlighting tools. Overall, appearance and functionality of the e-book are critical (Crestani, Landoni, & Melucci, 2006). Other students have also reported desiring more versatility in their e-books (e.g., a less rigid presentation of material), integrating more resources (e.g., dictionaries or YouTube links), adding features to reduce eye strain (e.g., a text-to-voice feature), and including a live chat feature (Lim & Hew, 2014).

Many of these features echo what students enjoy about paper books. Though the screen cannot mimic the exact feel of a print book, perhaps it can mimic other features. Increased attention to such details may enhance the unique assets of e-books. Given all the social media platforms out there, one could also consider how the bar has been set high for the expected nature of digital platforms. Students want interactive and engaging experiences that are user-friendly. One suggestion for publishers might be to enforce some sort of standardization for e-books that includes the aforementioned features. This standardization might act simultaneously to ensure a certain quality for e-books in addition to making the e-books more familiar to students. Currently, the functionality and offerings of e-books can vary widely, perhaps enhancing the feeling of unfamiliarity. E-books are not all identical. Eliminating some of these differences might make it so that once a student has used one e-book, the next e-book is easier to use. And if some of the required features mimic the perks of print books, perhaps e-books as a whole would feel even more familiar to students.

Lastly, to increase the approachability of e-books for students, deNoyelles et al. (2015) suggest campus-wide e-textbook initiatives (for instance, availability and marketing of e-books in conjunction with the university's bookstore) in addition to professional development for faculty (for instance, discussions of how to integrate e-books successfully and adjustment of course policies to allow for technology use). If there is more recognition of e-books on campus, and faculty are in tune with how these e-books function and work, students may also be more likely to purchase these e-books and use them in an effective manner. Faculty members should educate themselves on features available in their e-books, so that they are familiar with them and can provide helpful advice to students. Faculty members could even incorporate some of the features unique to e-books into their classroom, such as asking students questions about embedded videos or opening up supplementary resources, like comprehension quizzes, in class, if offered with that e-book. Perhaps publishers could include a tutorial with each e-book purchase - a thorough but brief demonstration of the organization of the e-book and the additional resources it has to offer. Knowledge is power; if faculty and students are informed on how to use e-books and do not have to hunt and peck to figure it out, they might reap more advantages than drawbacks in their e-book use. And if the e-book content is clear and engaging, and supported by their teacher, it might subsequently encourage students to also regulate their time more effectively.

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## SPOTLIGHT ON ONLINE STUDY TOOLS

Some e-books may encourage their readers to engage with complementary online resources, and this feature is certainly one that students have reported wanting to see more of. There are countless online study tools available, such as flashcard generators and quizzing programs. E-books can often embed links to videos, such as those available on YouTube, to engage the learner. Linking in specific study tools might also encourage students to practice the

material once they have completed reading it. This feature is something that e-books can offer over-and-above print books.

There is a fair amount of research on digital flashcard programs. Green and Bailey (2010) stated that students frequently use online tools to locate ready-made flashcards to save them the time it would take to make flashcards on their own. They also mentioned that these tools can include additional functionality, such as linking to social media or providing the ability to share cards with others. These tools would thus help provide that interactive component that students are seeking in e-books. However, students also did not often use these additional functions. Similar to e-books then, students might not be aware that such features exist, and thus education on how to use these tools might be important. Nakata (2011) also suggested that digital flashcard programs can assist in vocabulary learning by including unique program features like audio pronunciation. Several research studies have suggested that, at minimum, digital flashcards are as effective as paper flashcards (Sage, Rausch, Quirk, & Halladay, 2016) and that students may find mobile versions (such as on a tablet) more useful for their studying than reviewing flashcards on a stationary computer (Sage, Krebs, & Grove, in press). Additionally, some research has suggested that the accessibility and portability of mobile phones and similar devices might lead to large gains from mobile flashcard apps relative to paper versions (Basoglu & Akdemir, 2010).

There is also a growing body of literature on Quizlet. Quizlet includes not only flashcards, but also tests and study games to help enrich one's learning experience. Barr (2016) reported that learners using gap-fill flashcards on Quizlet scored higher on vocabulary tests than non-users. Similarly, Dizon (2016) found that Japanese EFL students felt like Quizlet was a useful and easy-to-use tool, which resulted in significant gains on their vocabulary tests. Though the research on this resource appears relatively limited to vocabulary learning, this tool offers the potential for deeper learning and should be explored further.

Overall, by incorporating links to study aids like those mentioned above, e-books could perhaps simultaneously boost engagement for learners and deepen learners' knowledge of the material. This amalgam could be a unique asset of e-books relative to print books.

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## CONCLUDING REMARKS

Though e-books are becoming increasingly popular on college campuses, they do not yet seem poised to take over the market. E-books offer unique benefits for learners, such as search/find tools and embedded links, but also have notable drawbacks, such as potentially longer read time and distracting elements. Students have similar learning outcomes from both book types, but their experiences can be quite different. When faculty and publishers work together to create an e-book, organization, appearance, and functionality must be considered. Some standardization might be helpful in increasing the approachability of e-books for students. When an instructor reviews books for their classes, they might also consider reviewing the e-version too to see what it can offer that may be above-and-beyond the print version. They can then encourage their students to engage in those offerings, such as viewing embedded links, to strengthen their learning of the material. Students may enjoy the reduced price of e-books, and may be pleased to discover that e-books can offer something special. That said, being plugged in can bring a myriad of distractions and may be more frustrating than helpful for some learners. Thus, it is an individual decision, and both teacher and student should be aware of the (good and bad) differences in experience that these book types may entail. Ultimately, e-books will likely continue to increase in availability and popularity given the digital age that we live in. Thus, educators should be familiar with what exactly e-books can offer students and how we can harness the positive nature of e-books to boost students' learning.

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# VIRTUAL PARENTING: APPLYING DEVELOPMENTAL PSYCHOLOGY

NATALIE HOMA THIEL COLLEGE

## INTRODUCTION

Experiential learning is an important component of successful higher education (Gosen & Washbush, 2004; Kolb, 1984; Kolb, Boyatzis, & Mainemelis, 2011), especially within psychology programs (Stoloff, Curtis, Rodgers, Brewster, & McCarthy, 2012; Svinicki & McKeachie, 2011). New technologies have provided unique opportunities to incorporate experiential learning in a psychology classroom, such as virtual case studies, a visual brain program (Pearson, 2017c), and interactive lab experiments (De Jong, 2015; Francis & Neath, 2015). One area of psychology that could benefit from such virtual technologies is developmental psychology. It can be very challenging for some instructors to provide students, for example in a child development course, with hands-on experience working with or observing children. In addition, the area of developmental psychology is interdisciplinary focusing on physical, social, emotional, and cognitive development. Therefore, it can be challenging to highlight the complex, interactive nature of development in these areas without hands-on experience. Developmental psychology instructors may utilize MyVirtuals (Pearson, 2017a) to address some of these issues.

MyVirtuals (Pearson, 2017a) are simulation programs published by Pearson to allow students to raise a virtual child as well as make decisions about their future older selves. There are three programs instructors may choose from: MyVirtualChild (Manis, 2014a), MyVirtualTeen (Manis, 2014b), and MyVirtualLife (Manis & Buckner, 2014). Briefly, MyVirtualChild simulates raising a child from birth to 18 years of age, MyVirtualTeen also simulates raising a child from birth to 18 with more focused questions and responses throughout adolescence, and MyVirtualLife provides simulation of being a virtual parent raising a child from birth to 18 as well as being an adult from emerging adulthood through older adulthood. Therefore, these programs may be appropriate for use in a Child Development, Adolescent Development, Adult Development, or Lifespan Development course, respectively. Access to MyVirtuals can be purchased as a standalone product (approximately \$50); however, they can be bundled with MyPsychLab/MyDevelopmentLab through a Pearson textbook (e.g., Arnett & Maynard, 2017; Berk, 2013). A more in-depth review of specifically MyVirtualChild capabilities along with identification of challenges and recommendations will be provided.

## MYVIRTUALCHILD

The layout of MyVirtualChild (MVC; Manis, 2014a) includes presenting students with various scenarios about their child and life, such as breastfeeding, stranger anxiety, or discipline that require the student to make a decision from three or four options. In addition to scenarios, students are also presented with life event items that describe various events, milestones, or problems in the child's life (e.g., achieved object permanence, started walking, you got a divorce, you received a job promotion). The number of scenarios and life events vary by age with on average eight scenarios and six life events each year. From birth to 18, students are provided with approximately 250 scenario choices and life event items (Manis, 2015). At approximately 12 time points throughout the program students are also presented more in-depth reports about their child (e.g., pediatrician report, school report, developmental assessment, psychologist's report) and may also respond to open-ended reflective questions. The latter can be

controlled by the instructor, which will be discussed in more detail later. Students see an image of their child throughout the program that changes periodically with age. The program does not allow the student to go back and change any responses; however, all scenarios, life events, reports, and reflective questions remain accessible to the student. The students (and instructors) can go back at any time to recall, for instance, when their child began walking or how the child performed academically in 5th grade.

Some unique features of the program include the inclusion of genetic-environmental influences on child outcome based on questions students respond to during initial setup of MVC as well as preset variables (Manis, 2015). Students are asked personality (e.g., emotionality, extroversion/introversion, aggression, self-control, and activity level) and ability (e.g., verbal, logical-mathematical, spatial, musical, and bodily-kinesthetic) questions that directly influence some of the child's outcomes. In addition, the program is also setup to reflect various cultural trends. For instance, 50% of the class will experience marital conflict with 25% of those resulting in divorce. About 60% of the class will require some type of childcare as both parents work outside of the home. Various health variables are also preset to relate to premature birth, breastfeeding, and other events. In addition, 10% of the students will have a virtual child that shows symptoms of dyslexia and 10% will have a virtual child experiencing symptoms of ADHD. Students also get to choose options for the appearance of the child: ethnicity/race (African-American, Asian American/Pacific Islander, European-American, Hispanic, and Middle Eastern), skin tone, hair color, and eye color. However, these options do not impact the behavior or outcome of the child.

In addition to incorporating relevant examples of genetic-environmental interactions, the program incorporates several more developmental theories. These theories include: Piaget, Vygotsky, Bronfenbrenner, Kohlberg, social learning theory, attachment theory, developmental systems theory, and family systems theory (Manus, 2015). This allows instructors many opportunities to make direct links to course concepts throughout the experience. For instance, I have students who commented that their child was being "too shy" around others or crying too frequently when he/she leaves the child. However, once we learn about attachment theory in class the students reflect back on their experience and recognize these behaviors as typical and healthy. (This experience also allows for great conversation about cultural differences.)

If instructors are hesitant about incorporating MVC or are new to the program, Manis (2015) provides a helpful and comprehensive instructor's manual. The manual provides tips for classroom discussion, integrating MVC into lecture, examples of activities from other MVC instructors, and tips for using MVC into a variety of classes. Manis also has a series of YouTube videos that walk one through a variety of topics (e.g., "Are you being a good parent?" "How do I assign MyVirtualChild?").

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## LEARNING OUTCOMES

One important question for instructors using digital tools is whether there is evidence that they positively affect learning. Oftentimes, there is little evidence of the effectiveness of new digital tools beyond anecdotal reports. This was the case for MyVirtualChild when first developed. However, a case study is now available for prospective users. This study (Babcock, n.d.) is specific to MyVirtualLife and is more heavily focused on outcomes related to use of MyPsychLab. However, results from a sample of 146 undergraduate students taken in 2013 revealed a significant positive correlation ( $r = .49$ ) between performance on MyVirtualLife assignments and in-class exams.

Additional research is available beyond Pearson sponsored research. One recent study examined qualitative data focusing on students' opinions of the program's effectiveness and their psychological engagement with the program

(Symons & Smith, 2014). Analysis of 113 undergraduate student teaching evaluations showed that 88% of the students reported the helpfulness of MVC and the ability of MVC to encourage critical thinking as good or very good. In addition, students reported feeling a bond with their virtual child (85%) as well as feeling happiness (44%) and pride (33%). Some students (51%) were self-reflective reporting they learned something about themselves as a future parent or about their own parents. A third of the students mentioned course content when evaluating MVC and 17% specifically stated the assignment helped them learn course content. The authors asserted that this feedback is reflective of psychological engagement, which is related to teaching and learning outcomes. Symons and Smith (2014) did not have a control group nor did they explicitly explore the effects of MVC on learning; however, Zimmerman (2013) did compare exam scores of 100 undergraduate students in either a control group (textbook only) or MVC only group. Results revealed significantly better exam grades for the MVC group compared to control group on exams with content most relevant to MVC. Qualitative responses from survey questions revealed 61% from the MVC group believed the program helped them learn class material, 45% stated that compared to a textbook MVC was more interactive, and 52% stated the MVC program made it easier to apply class concepts.

I also conducted a quasi-experiment in four sections of my own Child and Adolescent Development course taught at a small liberal arts college in the Midwest. My study compared outcomes of two experiential learning projects: students using MVC and students completing an interview project (Homa, 2014). The interview project required students to interview three different parents throughout the semester about their child's development and their experience as a parent. Participants included 91 undergraduate students (71.4% female; 90% Caucasian;  $M_{age}=19.97$  years) in a Child and Adolescent Development course in fall 2013 ( $N_{interview}=18$ ;  $N_{MVC}=20$ ) and spring 2014 semesters ( $N_{interview}=24$ ;  $N_{MVC}=29$ ). The majority of students were freshman (20%) and sophomores (44%) as well as non-psychology majors (77%).

On the first and last day of class, students completed the following to assess their knowledge of child development: Developmental psychology concepts questionnaire (DPC; 46 items; adapted from a variety of sources) and the Knowledge of Child Development Inventory (KCDI; 55 items; Larsen & Juhasz, 1986). In addition, throughout the semester students were required to respond to specific reflective questions via MVC or use related questions in their interview with parents. All students were also required to complete three short papers that asked them to find and summarize two empirical journal articles for each paper that related to their experience as a virtual parent or related to their interview experience. In addition, students participated in three corresponding discussion days in class. Finally, students completed a final paper that asked them to identify some major changes or patterns that emerged throughout their MVC experiences as well as reflect upon their experience as a virtual parent. The specific assignments can be provided upon request.

Results revealed no significant outcome differences between the MVC or interview group. This included final grade ( $t(89) = .71, p = .48$ ), DPC ( $t(87) = -.06, p = .95$ ), and KCDI total score ( $t(87) = -.85, p = .40$ ). However, pre and posttest differences revealed both projects to be effective in increasing knowledge of developmental psychology. Pre and post test results for the MVC group in particular revealed significant results for KCDI total score ( $t(44) = -3.26, p < .01$ ) and DPC total score ( $t(45) = -9.94, p < .001$ ).

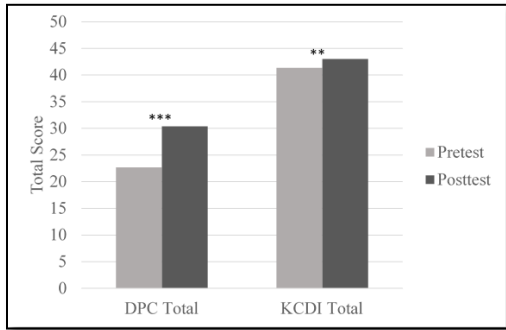


Figure 1. Results of pre and posttest analysis for MVC group. DPC = Developmental psychology concepts. KCDI: Knowledge of Child Development Inventory. \*\* $p < .01$ . \*\*\* $p < .01$

Repeated measures ANOVA revealed significant pre to posttest changes within the four subscale scores,  $F(4, 82) = 15.42, p < .001$ . The emotion development ( $F(1, 85) = 15.85, p < .001$ ), social development ( $F(1, 85) = 30.59, p < .001$ ), and cognitive development ( $F(1, 85) = 15.65, p < .001$ ) subscale scores of the KCDI revealed significant improvement from pre to posttest; however, no changes were seen in knowledge for physical development ( $F(1, 85) = .16, p = .69$ ). See Figures 1 and 2 for mean scores from the MVC group.

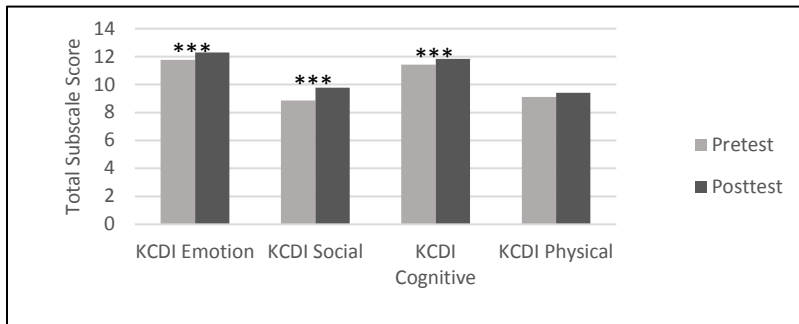


Figure 2. Results of pre and posttest analysis on KCDI subscales for MVC group. KCDI: Knowledge of Child Development Inventory. \*\*\* $p < .001$ .

In addition to the quantitative research, I have also examined qualitative results from two sections of the Child and Adolescent Development course during Spring 2017. I focused the analysis on the last reflective question of the MVC program stating, "Congratulations!! You've raised your virtual child! Reflect on the process of raising your virtual child from birth through adolescence. What have you learned from this experience? As you think about your 18 year old son or daughter today, what do you think were the key events or experiences that shaped his or her developmental outcomes?" Four research assistants and I reviewed responses from 59 students, we discussed the themes that emerged, then coded the responses, and resolved any disagreements that emerged (see the Table 1 below for examples). Each response could contain multiple themes. The most common theme was the discussion of parental decision-making. Most of the responses reflected either the idea that there are many difficult decisions to make as a parent or how influential each decision is to the development of their child. This is a great lesson to learn; however, I do worry that especially the latter is a bit exaggerated. Yes, decisions do matter but MVC reflect single decisions about single moments in time. It is unclear from this response whether or not students were able to synthesize their experience. Could they see patterns in their decision-making that would be more impactful than a single decision?

**Table 1***Content Themes from Student Reflective Responses (N = 59)*

<b>Content Theme (% reported)</b>	<b>Student Example</b>
Parental decision making (49%)	"I've learned that babies are hard to raise and all your choices go into how well your kid turns out."
	"From this experience I have learned that making decisions as a parent are difficult but they seemed to get easier the older that Hunter got. I also learned that I used my mom as a reference a lot of the time."
	"What I've learned from this experience is that every choice you make as a parent is crucial to how your child will turn out."
Application to future self (25%)	"While answering questions, I thought about what I was actually going to choose to do when I had my own."
	"I thought it was really fun to raise a virtual child and I always chose options that reflected how I would raise a child in real life."
	"I have learned many things throughout this experience of raising Emma. ... This experience gave me insight on how I would raise my child as well as the things that I would do different when it comes to raising a real child."
Engagement (20%)	"I really enjoyed raising my virtual child. I actually got pretty attached to him. ... I kind of feel at a loss without having to make any more decisions for him or trying to help him be a good man when he grows up."
	"I really enjoyed this simulation and it was a great and fun experience. It made you really think about what would be the best decision for your child. I took on a lot of the scenarios as if I was a real parent in that situation and what I would do in that situation."
	"I have learned from this Virtual Child experience that becoming a parent is scary because you have so many responsibilities that you have never had to deal with before."
Difficulty of Parenting (19%)	"I have learned that parenting is hard. There is no easy way to parent and you try to do what is best for your child but you never know what the outcome will be."
	"What I have learned from this experience is that parenting is harder than it looks. I understand my parents a little more after raising my virtual child because I understand how they had to make hard choices when it came to how to raise me."
	"From raising my virtual child something that I learned is that raising a child is going to be difficult and even though my child turned out pretty great virtually, I'm going to be in for a journey when I do eventually have my own real child."
Application to class (8%)	"I thought that raising a virtual child was a great experience. I could relate the MyVirtualChild questions and choices to class."
	"This was a very eye opening assignment and project that allowed me to put in to practice what we were learning in class."
	"I was also able to observe the different theories of development as well as apply a lot of what we were reading about in class to raising my child."

From these responses, I also identified content from the class that they used to support their answer. See Table 2. The most frequently reported topics related to school and intelligence, which may have been primed by their child's most recent life events (i.e., graduating from high school and making decisions about tertiary education). Regardless, the top topics discussed do reflect the cognitive and socioemotional development knowledge that seemed impacted by the MVC experience as revealed in the quantitative data (Homa, 2014). There were only a handful of discussions about physical development including fine motor skills, brain plasticity, and puberty.

Table 2

*Course Topic Coding from Student Reflective Responses (N = 59)*

<b>Course Topic</b>	<b>% Reported</b>
School/intellectual ability (day care, school choice, success, disability)	54%
Parenting style	40%
Divorce/marital conflict	20%
Language development	20%
Social development (peers, social skills, attachment)	20%
Adolescence (puberty, risk taking)	19%
Socioeconomic status	12%
Sibling relationships	10%

Overall, both quantitative and qualitative research suggest MVC is effective in getting students engaged, encouraging critical thinking, specifically application, and learning course content. Additional research is needed to further explore the effectiveness of MVC on learning, especially long-term effects.

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## CHALLENGES AND RECOMMENDATIONS

Upon completion of a semester using MVC, my feelings about the use of MVC tend to be positive. Students' final papers were enjoyable to read. It is clear they were engaged in the experience and were able to apply content thoughtfully from class to their experience. However, the week-to-week experiences with MVC are not always as problem-free. Most of the challenges I encounter fall under technological difficulties, student concerns, and implementation.

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## TECHNOLOGICAL DIFFICULTIES

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### GLITCHES

The only glitches I came across, as the instructor, was from user error. Somehow, I had a previous class linked to my new class, so students were logging into the wrong MVC account. However, once the students and I noticed the error, my students were able to change the course ID easily and I was able to get the students back on track. In addition, I did not realize that once students have accessed a reflective question section of the program, any changes to those questions by the instructor will not appear changed for those students. Therefore, be sure all reflective questions are chosen and edited before students obtain access.

Most students' problems have been with saving responses to the program. Some students typed the response right into the textbox but the program did not save the entire response or it saved nothing at all. Unfortunately, Pearson has no way to retrieve this work or confirm the student's attempt. I have become aware of two possible explanations: 1) The program times out on the student, but does not provide any warning; or 2) the student used an ampersand or apostrophe in the paper. The latter is obviously a more difficult problem to solve as any proper citation would include an ampersand and apostrophes are very common. My solution has been to warn the students of this glitch and encourage them to type their response in a word document so that regardless of whether MVC saves their work they will have their work saved.



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## GRADING

To my knowledge, MVC does not communicate with any learning platform such as Blackboard or Moodle. In addition, instructors may read question responses and see students' progress within the program but there is no place to record grades within MVC nor provide feedback to students. However, you can export responses into an Excel sheet to record feedback and aid in grading.

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## STUDENT CONCERNS

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### COST

Each semester I do hear from a handful of students with genuine concerns about the cost of the program (especially when bundled with MyPsychLab). Bundling MVC with MyPsychLab does provide the student with the eText, which can be more affordable than a print version of the textbook; the one-time access code for MVC is not helpful financially. Students do not have the option to rent MVC nor can they sell it back to the publisher. Therefore, the use of MVC (especially when bundled with MyPsychLab) may present a financial problem for some students. MyPsychLab does provide a 14-day trial period so students who may need more time to acquire funds for the materials will not get behind in the class.

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### PROCRASTINATION

I was most frustrated with some of my students' procrastination. I meant for this to be a semester-long experience that required thoughtful reflection and connection to class. However, in reality some students would raise their child several years the night before the due date. The program does provide a timestamp for when students have viewed life events or reports as well as when students have submitted answers to scenarios and reflective questions. While I have not gathered evidence to support this claim, I do believe those who would raise their child the night before were not benefiting from the experience. Seemingly, they would be rushed in their responding to scenarios and likely skim through the reading of events and reports. In addition, because they were only spending a snapshot of time with their virtual child it was likely they would not encode much of the experience to reflect on later in the child's development or successfully connect the experience to class material.

I would recommend setting multiple deadlines to encourage paced completion of the assignments. I have three to four separate deadlines throughout the semester that correspond with course exams; therefore, class discussion of MVC also acts as an exam review. However, I have considered making a total of six to eight deadlines to ensure some work has been completed before the "final" deadline. For instance, if students were to raise their child from birth to 30 months for a discussion day in class, then I would break that down to ensure students raised their child from birth to 18 months by X deadline and 18 to 30 months by Y deadline.

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## REACTIONS

As noted above, it seemed most reactions to the overall experience were positive and enlightened. However, there were some aspects of the program that surprised the students. First, I heard often that they wish the program had more options because the response they would have given as a parent in that scenario was not one of the three or four options. In addition, some students reacted defensively to some life events. For instance, as in the United States, about half of the students in the class will experience marital conflict with many leading to divorce. Many of my students asserted they would *never* get divorced and were appalled that they got divorced. The one challenge

this presented was to encourage the student to understand conditions that might lead to divorce despite one's convictions to stay married. In addition, the student must be challenged to identify evidence-based risk factors for negative outcomes of divorce to discourage blaming all struggles with the child on the divorce. Additionally, some students would express disappointment that they shared similar experiences with classmates such as the pet goldfish dying, child getting a concussion, and teenager getting a tattoo. The program asserts that "...depending on the child's and the student parent's personality characteristics at birth, decisions the student makes about child rearing, and random events in the environment, each child will develop along a unique path" (Manis, 2015, p. 5). However, not every single student will have a distinct, fully unique experience. I actually found discussion about these similar life events to be more engaging. The students would be able to discuss their thoughts about the event or their different responses to the scenario.

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## IMPLEMENTATION

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### TOPICAL V. CHRONOLOGICAL.

The first time I incorporated MVC into my classes I was using a topical style approach to teaching child and adolescent development. Teaching topically was my preference and I had been using Berk (2013) for a few years; therefore, I added MVC bundled with MyPsychLab. Because of the ability to edit your own reflective questions into the program, it was not that difficult to ensure course content could be linked to the experience. For instance, we did not cover language development in class until the students had raised their virtual child to six years of age. They responded to the following: "Describe your child's language development since birth. Has he/she developed typically? Struggled in areas? Continues to struggle? Give specific examples. Also, describe how any struggles were dealt with or are being dealt with." In theory, this would be a great question that requires students to revisit information in the program and integrate that information for a complete evaluation of language development from birth to six years. However, in practice, students often did not thoroughly analyze the development. The manual (Manis, 2015) does provide helpful tips for use of MVC while teaching topically; however, it is more challenging than teaching chronologically.

The last two times using MVC I taught the course chronologically and the students seem to make connections to the class far more easily; however, I have no data to back up this claim. Their child experienced the same developmental concept we discussed in class (e.g., first word; separation anxiety; risky behaviors). However, using Arnett and Maynard (2017) presented me with the challenge of continuing to emphasize a cultural approach throughout the course but with very little to no discussion of culture throughout MVC. Manis (2015) explained that "A generic American middle-class environment is assumed to be in place" (p. 20) throughout the program. He noted because of the variation in cultural values and experiences of different racial, ethnic, and religious groups in America it is too difficult for the program to simulate them; he feared the attempt may be stereotypical or offensive. Therefore, it is important to include discussion of cultural differences as part of the reflective questions and class discussion. It is especially important to not only identify some cultural differences in America but also within other developed nations as well as developing nations.

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### LEARNING OBJECTIVES

When integrating any technology into the classroom, one should only do so if it meets the learning objectives of the class. Therefore, I believe it is important that instructors spend time editing or creating their own reflective questions for the program to achieve your learning objectives for the course. Relying on the default questions (i.e., three questions will automatically appear to students in all 12 reflective question sections) may not be as effective as

tailoring the questions to your class goals. Luckily, editing these questions or adding new questions is very easily done. However, one must have all edits and decisions about what questions and how many questions to choose prior to the students virtually raising their child to that age.

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## CONCLUSION

MyVirtuals can be an effective tool for students to engage with developmental psychology, critically evaluate the application of key concepts, and retain information long term. MVC encompasses many of the key components of experiential learning: Simulates real-world situations and problems; situations involve ill-defined problems with multiple response options; students lead the problem-solving; and students spend time reflecting and receiving feedback on their responses (Svinicki & McKeachie, 2011). However, to be effective as an experiential learning tool one must properly implement and fully integrate the simulation program into your course. If it is simply used as a fun activity or “busy work,” it is unlikely to aid in learning.

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CHAPTER  
22

# STUDENT AND FACULTY EXPERIENCES WITH GOANIMATE4SCHOOLS: A CASE STUDY

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## INTRODUCTION

It comes as no surprise that students of today learn differently than those of yesterday largely because of how technology has affected how we design and deliver learning experiences to our students. Indeed, the rapid change of technological advances we witness in the classroom continuously challenges us to experiment and reflect on how technology can be leveraged to our students' benefit. As seen in this eBook, a variety of technological innovations are being used in the classroom ranging from specific applications like MyVirtuals (see the Homa chapter) or Pesky Gnats (see O'Reilly chapter) to learning management systems like Canvas or Blackboard (see the Cerniak chapter). One technology that our group of authors have not discussed is animated text-to-video web platforms that can provide students with an opportunity to engage in course material, share ideas, solve problems and demonstrate competency. There are a number of text-to-video technologies available to instructors including but not limited to Nawmal for Schools (<https://school.nawmal.com>), Plotagon Education (<https://plotagoneducation.com>), Moviestorm (<http://www.moviestorm.co.uk>), and GoAnimate4Schools (<https://goanimate4schools.com>). Because GoAnimate4Schools has become the leading software in this niche market (Stratton & Julien, 2013) and because it has been used by the authors, our chapter will provide an overview of this technology.

## WHAT IS GOANIMATE4SCHOOLS?

GoAnimate4Schools is a web platform that allows for the creation of customized animated videos. GoAnimate4Schools' design is intuitive, especially for those who are familiar with navigation buttons and pull-down menus. (See Figure 1.)



Figure 1. GoAnimate4Schools' Interface

Perhaps the most challenging task for students is to write the monologue or dialogue for their animated video (more on this later). Once this task is completed, students are lead through eight steps that result in a finished animated video. We will now detail each of these steps.

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## STEPS IN CREATING A GOANIMATE4SCHOOLS VIDEO

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### STEP 1: SELECT A THEME

GoAnimate4Schools has a number of themes from which to choose that sets the tone for the animated video. (See Figure 2).

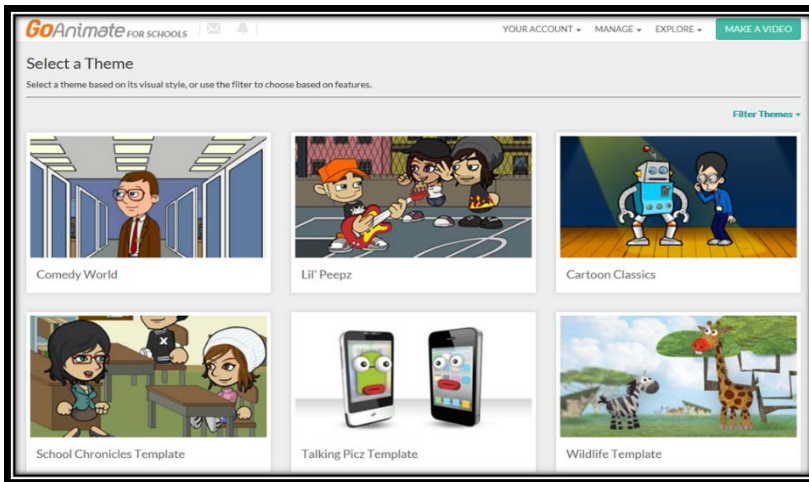


Figure 2. Example Themes in GoAnimate4Schools

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### STEP 2: SELECT A SCENE

Based upon the Theme selected, a number of scenes are available in which to base an event or interaction. (See Figure 3.)

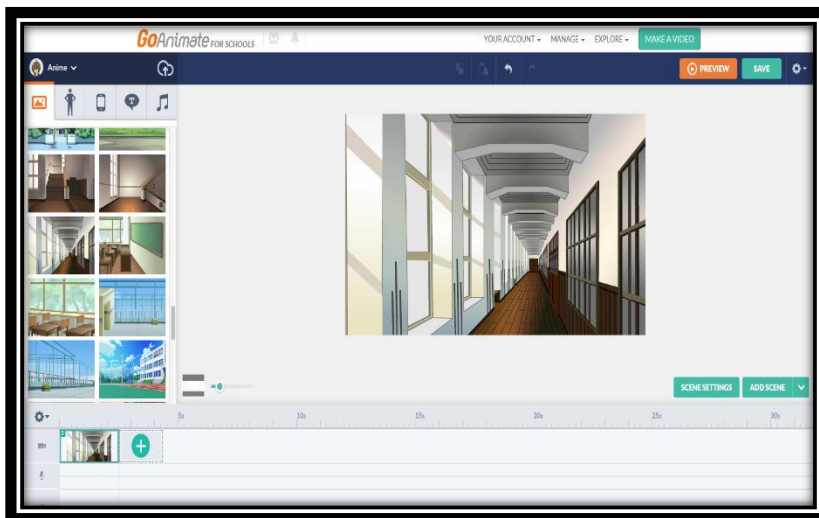


Figure 3 Example scenes in GoAnimate4Schools

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### STEP 3: SELECT CHARACTER(S)

Depending on the Theme selected, a variety of existing characters is available. Each character can be modified if desired (e.g., clothing) or if the student is adventurous, characters can be generated by selecting from existing character templates (e.g., gender, hair color, hair style) that produce a unique character. (See Figure 4.)

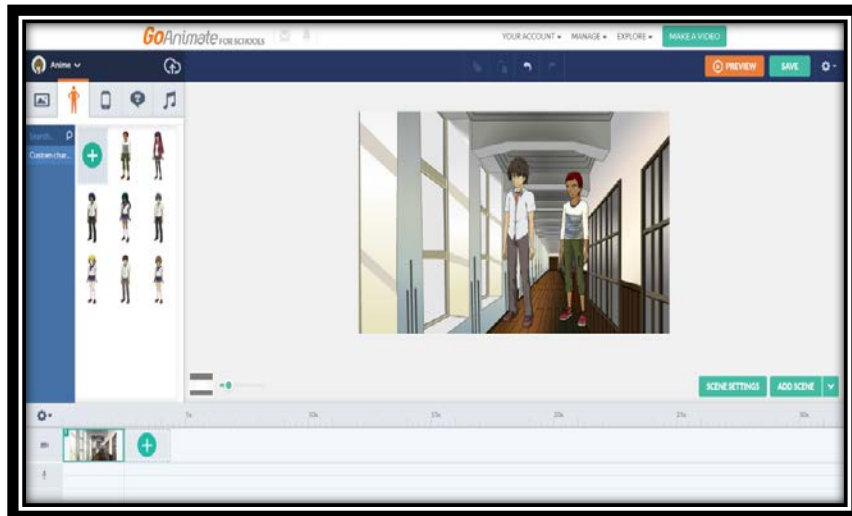


Figure 4. Example characters in GoAnimate4Schools

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### STEP 4: SELECT PROPS FOR THE SCENE

Additional items can be added to a scene. The props are specific to a scene, and although plentiful, they are limited in the sense that props cannot be created by the student. (See Figure 5.)

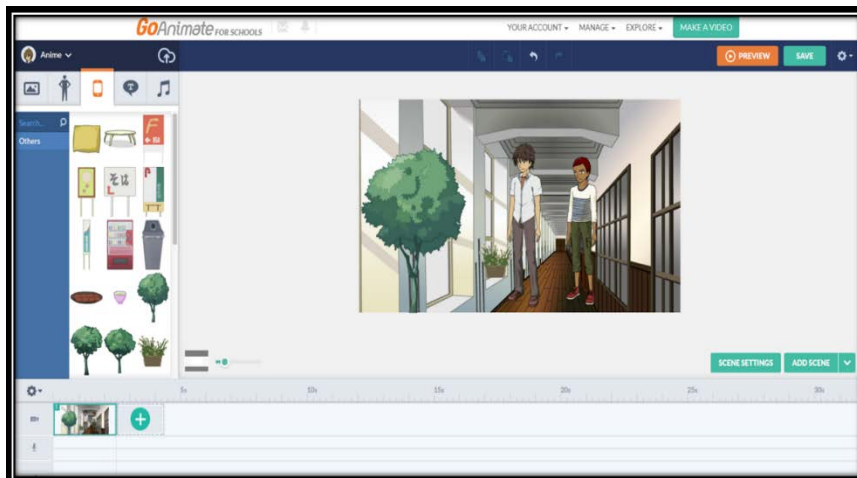


Figure 5. Example props in GoAnimate4Schools

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### STEP 5: ADD A CALLOUT BOX IF DESIRED

Callout boxes may be added to emphasize an important point being made in the animated video. The callout box and font styles can be selected by the student. Students cannot create callout boxes or font styles. (See Figure 6.)

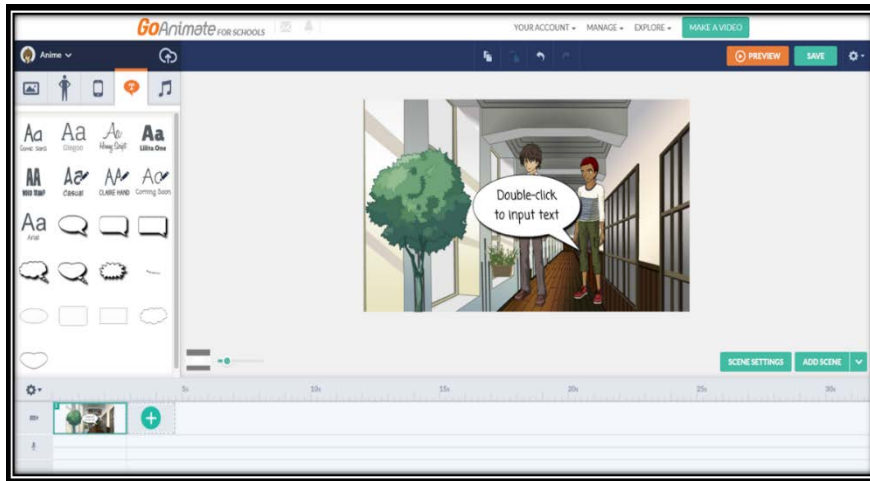


Figure 6. Example callout boxes and fonts in GoAnimate4Schools

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### STEP 6: ADD BACKGROUND SOUNDS IF DESIRED.

GoAnimate4Schools has pre-loaded music clips and sound effects files that may be used in students' animated videos. Using the music clips and sound effects are not needed (and in our experience, few students use them) but a well thought-out and placed piece of music or sound effect can focus viewers' attention to important information being presented. (See Figure 7.)

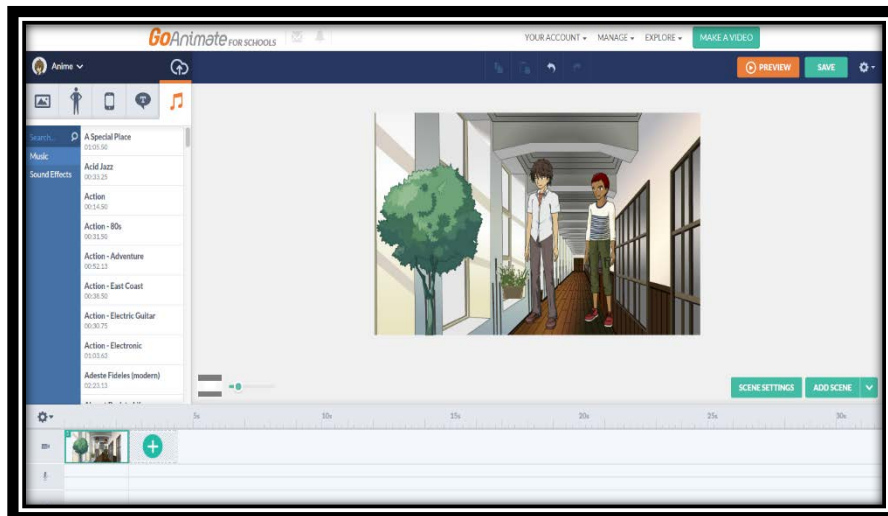


Figure 7. Example music files in GoAnimate4Schools



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## STEP 7: ADD DIALOGUE

Once Steps 1-6 have been completed, students are ready to add dialogue to their animated video. There are a number of options available to students including adding an MP4 file (recording the dialogue outside of GoAnimate4Schools), recording the dialogue using the built-in recording option in GoAnimate4Schools (a microphone is needed on the device being used), or having GoAnimate4Schools generate the dialogue from students' text input (a keyboard is needed on the device being used). (See Figure 8.)

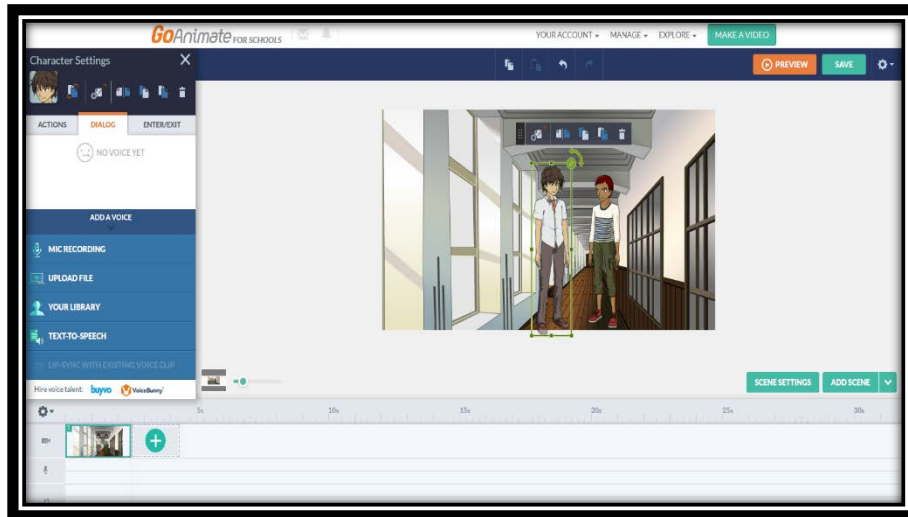


Figure 8. Example dialogue entry options in GoAnimate4Schools

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## STEP 8: ADD MOVEMENT.

Movement is what differentiates an animated video from a still video (i.e., video imagery that is not intended to convey the appearance of movement). This is easy done by choosing a character and then selecting from a pre-loaded movement. Custom movements can also be created, if desired.

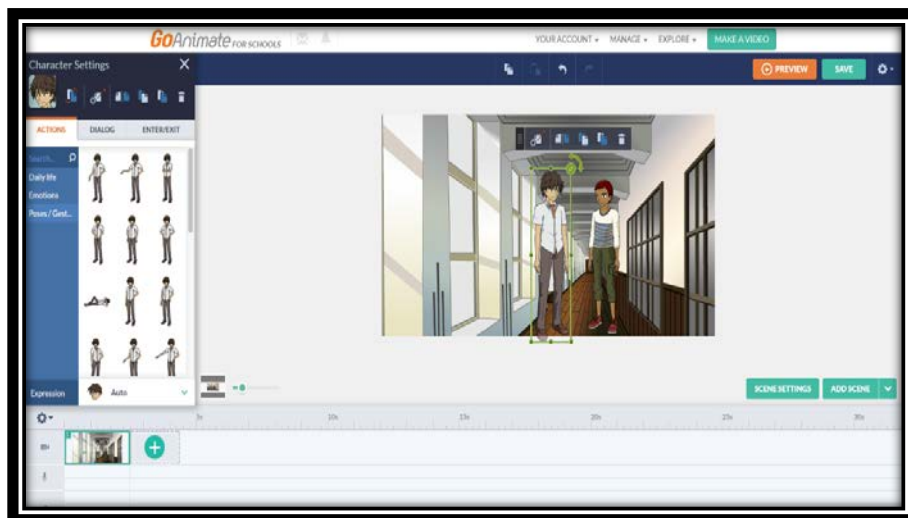


Figure 9: Example movements in GoAnimate4Schools

The preceding is all that is necessary to create an animated video in GoAnimate4Schools. Interested faculty should visit the GoAnimate4Schools website (<https://goanimate4schools.com>) and sign up for a free 14 day trial ([https://goanimate4schools.com/public\\_signup/order/trial](https://goanimate4schools.com/public_signup/order/trial)) to try the web platform. Faculty should know that although the web platform is used at the post-secondary education level, its primary audience is K-12. Thus, students cannot export their work; only faculty can. Relatedly, faculty have the option of moderating student videos before they become visible to other students (which in today's hypersensitive environment may be useful even at the collegiate level). Should faculty be uninterested in moderating student videos, they should also be aware that student videos remain private until faculty approve the work. As potential privacy concerns may cause pause for adoption, GoAnimate4schools promises never to collect email addresses and contact information from its users.

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## PERSPECTIVES

In this section, we discuss the benefits and drawbacks of GoAnimate4Schools from both student and faculty perspectives.

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### STUDENT PERSPECTIVES: THE BENEFITS

As noted previously, the authors have used GoAnimate4Schools in their courses. To assess students' perspectives of using the software, they surveyed students at the close of course asking them for their reactions. Below are the themes that emerged from the feedback:

- **Creativity.** Students noted that GoAnimate4Schools allows for more creativity compared to writing a traditional term paper. For example, students often have psychologists of disparate theoretical orientations debate each other in unusual circumstances that have an unexpected storyline twist. For example, one memorable animated video created by a student featured B.F. Skinner and Sigmund Freud, who had a chance encounter at a local bar. After each had a few drinks (and snide comments were made about each other's theories), they had a heated argument over how the unconscious influences behavior. When fisticuffs was imminent, Abraham Maslow, who also is in the bar, attempted to defuse the situation. He did so by stating that a truly self-actualized person would not have to win such a silly argument as they are having. Embarrassed, Skinner and Freud begin to tease Maslow about his ideas on free will. They leave the bar as friends agreeing that all behavior is determined.
- **Engagement.** Students reported that they were more engaged in the assignment compared to traditional term papers. They reported that having to create the video was fun (i.e., "It didn't seem like school work but something that I would do in my free time"). Student also reported that because the assignment was engaging, they were more motivated to produce a higher quality product. Motivation is the most important factor that impacts learning (Pintrich & Schunk, 2002; Pintrich, Wolter, & Baxter, 2000) and that student motivation is determined by the student, the teacher, the content, the method/process, and environment (Williams & Williams, 2011). In the case of GoAnimate4Schools, the method/process seemed to have played a more prominent role in students' motivation to produce a quality product.
- **Familiarity.** Although writing a term paper may not be familiar to all students, the technology used in GoAnimate4schools is. Students reported very few problems with the interface and web platform. Much of the extant research (e.g., Courts, & Tucker, 2012; McHaney, 2011) on Millennials and technology suggests

that they are comfortable and proficient with technology. As a result, GoAnimate4Schools seems to be one way to capture students' attention and empower them to take control of their education.

- **Diversity.** Finally, students noted that creating an animated video added to the diversity of their academic and professional experiences. This is important because multiple approaches to learning, including those that feature technology, enhance critical thinking that serves the student well for their next stages in life (Behar-Horenstein & Niu, 2011).

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#### STUDENT PERSPECTIVES: THE DRAWBACKS

- **Monologue/Dialogue.** The primary drawback to GoAnimate4Schools from the student perspective is the observation that writing the monologue or dialogue was less interesting than creating the video. This resulted in some students spending too much time on the look and feel of the video than on the content.
- **Time Management.** Although not unique to the use of GoAnimate4Schools, several students often underestimated the amount of time needed to complete the assignment. The lack of proper planning resulted in a product that either lacked quality content or was executed (i.e., animated) poorly.
- **Internet Speed.** Because GoAnimate4Schools is a web-based program, students need to have high speed Internet access. Although students could use the widely available computers on campus, many opted to use their computers and/or tablets at home. A few noted that because they did not have high speed Internet access at home, the creation of the animated video took longer to create compared to classmates who had high speed Internet access at home.
- **Computer Access.** As smartphones have evolved to become portable microcomputers, students often forgo the purchase of a desktop or laptop computer. For such students, having to use a campus desktop computer was reported to be a hassle and these students complained and questioned why they could not create their animated video on their smartphones. (GoAnimate4Schools will not work on smartphone operating systems.)

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#### FACULTY PERSPECTIVE: THE BENEFITS

In reflecting on our use of GoAnimate4Schools and students' feedback, we drew the following observations concerning its use:

- **Creativity.** We were impressed by some of our students' creativity when using GoAnimate4Schools; however, not all animated videos scored high in creativity. But for those with an artistic flare, this was an option they were more likely to choose over writing a traditional term paper. We recommend providing the choice – create an animated video or a traditional term paper – so that students can select the option best suited for their talents.
- **Engagement.** We observed that students seemed to enjoy creating their animated videos because it was something different (and perhaps something that they might do in their free time). However, not all students were successful in the creation of their animated video because of poor time management, or spending too much time on non-content related issues.

- **Familiarity.** Students did not have difficulty working with the technology. This is always a concern when using technology in the classroom because it can pose problems for completing the assignment (i.e., students can become frustrated and give up).
- **Peer Review.** Because the video tends to capture the interest of students, they are interested in what their peers have created. This creates the opportunity for peer reviews where students provide feedback on others work and receive feedback on their own work. This is important because research has demonstrated that the production of feedback and the receipt of reviews may enhance students' learning (Nicol, Thomson, & Breslin, 2014). Indeed, feedback from instructors does not seem to improve student learning (Crisp 2007; Bailey & Garner 2010; Wingate 2010).
- **Plagiarism May Be Held In-Check.** In as much as students must write their monologue/dialogue prior to animation, the monologue/dialogue can be checked for plagiarism through TurnItIn. Additionally, with the use of storyboarding, the potential for simply downloading an animated video and reproducing it may be reduced. Access to social media such as YouTube is blocked inside of GoAnimate4Schools to prevent plagiarizing an existing animated video.

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#### FACULTY PERSPECTIVE: THE DRAWBACKS

- **Monologue/Dialogue.** As noted by students, a potential drawback is that some students will spend more time on the look and feel of their animated video than on its content. Faculty interested in using GoAnimate4Schools should require multiple drafts of the monologue or dialogue before having students use the software.
- **Time Management.** Students often underestimate the amount of time needed to create their animated video. Faculty should provide students with a timeline that includes hard deadlines where components are due (e.g., a draft of the monologue/dialogue is due in week 5).
- **Accessibility for Visually Impaired.** GoAnimate4schools can be a challenge for the visually impaired student. Although a screen reader may be able to relay textual elements aloud, the visually impaired student will have difficulty creating an animated video. Accommodations will need to be made such as having the visually impaired student work with a sighted helper. (See the Knopf, Knopf, Anderson, and Waranka chapter for a more detailed discussion.)
- **Cost.** Another potential drawback is the cost. Although minimal compared to software such as SPSS which we use in our research methods and statistics courses, a one-year license for GoAnimate4Schools is \$668 for a 5 teacher, 200 student plan. Faculty interested in using the software will need to add a line item to their department's ever dwindling budget.

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#### GRADING

A different kind of grading is required if students decide to create an animated video. A common method of assessing performance is through the use of a rubric. A rubric provides students (as well as the grader) with descriptions of levels of quality, usually on a point scale (Sadler & Good, 2006) where the goal of the rubric is to provide definitions of quality for both the student and instructor (Shepherd & Mullane, 2008). Additionally, rubrics can assist students

in developing a sense of ownership for their work because it helps focus students on elements associated in the assessment process (Shepherd & Mullane, 2008).

To help our students focus on the content of their animated video, we provide them with a grading matrix that emphasizes content. This is because one of the drawbacks recognized by our students (and the authors as well) was they often spent less time on the content of their videos. Thus, we weighed content much more heavily than the other components of the assignment. An example of our grading matrix is presented below. (See Table 1.)

Table 1. *GoAnimate4Schools Grading Matrix*

<b>Assessment Criteria</b>	<b>Poor (1)</b>	<b>Fair (2)</b>	<b>Good (3)</b>	<b>Excellent (4)</b>
Knowledge of content (50%)	Content is vague or inaccurate.	Facts are presented.	Thorough understanding of content is evident.	Content presented shows synthesis of information in concise and understandable manner.
Organization of content (20%)	Information is presented in a random fashion.	Information is presented in orderly manner but may ramble.	Information presented in a logical and concise manner.	Information presented in a way that helps listener remember content (e.g., callout boxes, summaries).
Alignment with learning objective (10%)	Little connection with intent of student learning.	Information presented supports learning outcome.	Learning outcome is completely addressed in video.	Learning outcome is addressed and connections made to related topics.
Animation (5%)	Lacks congruence between speaking and actions of figure(s).	Movements correspond to speech.	Movements of actors enhance content.	Uses sound and motion effects to enhance knowledge presented.
Personality (5%)	Presentation is dry.	Presentation is interesting.	Uses humor to emphasize points.	Very creative and clever. Personalizes to audience.
Audience specific (5%)	Uses language audience will not be likely to understand.	Language is appropriate for audience.	When difficult or new terms are used, they are explained.	Clip created specific for the listener and not a general audience.
Grammar (5%)	Contains errors.	Almost grammatically correct.	Grammatically correct.	Words used are perfect. Changes would not enhance the presentation.

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## CONCLUSIONS

The use of GoAnimate4Schools can motivate students to produce a higher quality product because it allows them to be creative while using a technology with which they are familiar. Students also may be more engaged in the assignment because it is different from a typical term paper. Additionally, creating an animated video adds to the diversity of students' academic experiences which may aid in the development of life-long critical thinking skills.

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CHAPTER  
23

# PESKY GNATS! USING COMPUTER GAMES AND SMARTPHONE APPS TO TEACH COMPLEX COGNITIVE BEHAVIOURAL THERAPY AND MINDFULNESS CONCEPTS TO CHILDREN WITH MENTAL HEALTH DIFFICULTIES

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## INTRODUCTION

The aim of this chapter is to describe how technology can be used as a very effective tool in the delivery of evidenced-based mental health interventions. It will focus on the role of technology in the psychoeducation of children about Cognitive Behaviour Therapy (CBT).

The application of technology to mental health is intuitively appealing to many people. Its most common use is to solve the widespread problem of the lack of availability of mental health services in the face of large and unmet public need (Bower & Gilbody, 2005; Clarke 2011). In essence, this is a problem of *availability* tackled through the reach of Internet technology. There are an ever-increasing number of high quality evidenced-based mental health programmes available online attaining a small to moderate improvement on a range of psychological difficulties such as anxiety and depression for those who use them (Twomey & O' Reilly, 2013; Twomey & O' Reilly, 2016; Twomey O' Reilly & Meyer, 2017). However, the focus of this chapter concerns a different use of technology to solve another problem faced in mental health intervention for young people. That is, how we can use technology during mental health interventions to help young people better understand and apply the often-complex concepts of evidenced-based models of psychological functioning such as CBT. This is a problem of *complex concept education* tackled through the medium of technologies such as specially designed computer games and smartphone apps.

This chapter begins by outlining the underlying theoretical model of CBT, the mental health intervention with arguably the strongest evidence base (Dozios & Beck, 2011; Hofmann, Asnaani, Vonk, Sawyer, & Fang, 2012). Although there are many successful applications of this model for children, they all face the obstacle of making the complex, and at times abstract, ideas of CBT easily accessible to children whose cognitive development may not readily lend itself to abstract thinking. This chapter will then describe the design of *Pesky gNATS*, a not-for-profit computer game and app for children aged seven and older with clinically significant anxiety or low mood. It is designed for them to play in session with a mental health professional, and uses technology to make CBT concepts more accessible and applicable.

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## THE COGNITIVE BEHAVIOUR THERAPY MODEL

The description of the CBT theoretical model presented in this section is based on Beck (2011), Beck & Haigh (2014), and Dozios and Beck (2011). The CBT model can seem like a relatively simple representation of human functioning proposing that there is an important relationship between our thinking, our feelings, and our behaviours. However, in reality, the model is more sophisticated than this and its individual application requires the development of complex self-monitoring, openness to flexible evaluative thinking, emotion regulation and behavioural change. The left side of *Figure 1* and the description below presents the traditional generic CBT model as typically applied to clinical anxiety or depression where psychological processes are divided into three levels.

Level One refers to "Surface Level Cognition." In response to any given situation in the world "automatic thoughts" continuously flow through our mind priming our feelings and behaviours. Our automatic thoughts are usually involuntary, often unnoticed and typically accepted without reflection or deliberation. They can be a brief verbal thought or a quickly passing image. Automatic thoughts can be positive, negative or neutral. Our automatic thinking and its relationship with our feelings and behaviour usually remains outside or below our conscious awareness. When experiencing a mental health difficulty our automatic thoughts are predominately, but not necessarily, exclusively negative (i.e., either simply unhelpful or more negative than warranted compared to objective deliberate thinking).

CBT for anxiety or depression usually begins by orienting people to the CBT model with the aim of helping them bring the usually unnoticed process of the relationship between automatic thoughts, feelings and behaviours into awareness with a special attention directed to the identification of potential negative automatic thoughts. Negative automatic thoughts can be "distorted" or unhelpful in a number of ways. On examination, the distortion of some of our thoughts will be clear (e.g., "no one ever appreciates a single thing I do..."). Others may appear reasonable but their implication belies a distortion (e.g., on seeing someone I forgot to do something for I am reminded of my lapse and have the simple accurate thought "I forgot to do that." If this implies to me that I am a no good, unreliable incompetent fool then understanding the implication of this brief thought reveals its associated negative feeling and behaviour). Other negative thoughts may be accurate, but in a given situation unhelpful (e.g., I find myself at an airport thinking "Aeroplanes crash...what if this plane crashes?" as I board. It is accurate that aeroplanes do indeed crash but considering the personal safety implications of this may be better done at a time other than pre-boarding).

As we become more aware of our personal moment-to-moment automatic thoughts, feelings and behaviours, they become available for reflection and evaluation. This allows us to begin the next step in managing anxiety or low mood which is to objectively judge the helpfulness (utility) and accuracy (validity) of our automatic thinking, and its feeling and behavioural trajectory, particularly at times of distress or difficulty. The early phases of CBT are oriented to level one (or surface level cognitions) in Beck's model and are concerned with developing cognitive monitoring and cognitive appraisal and modification skills.



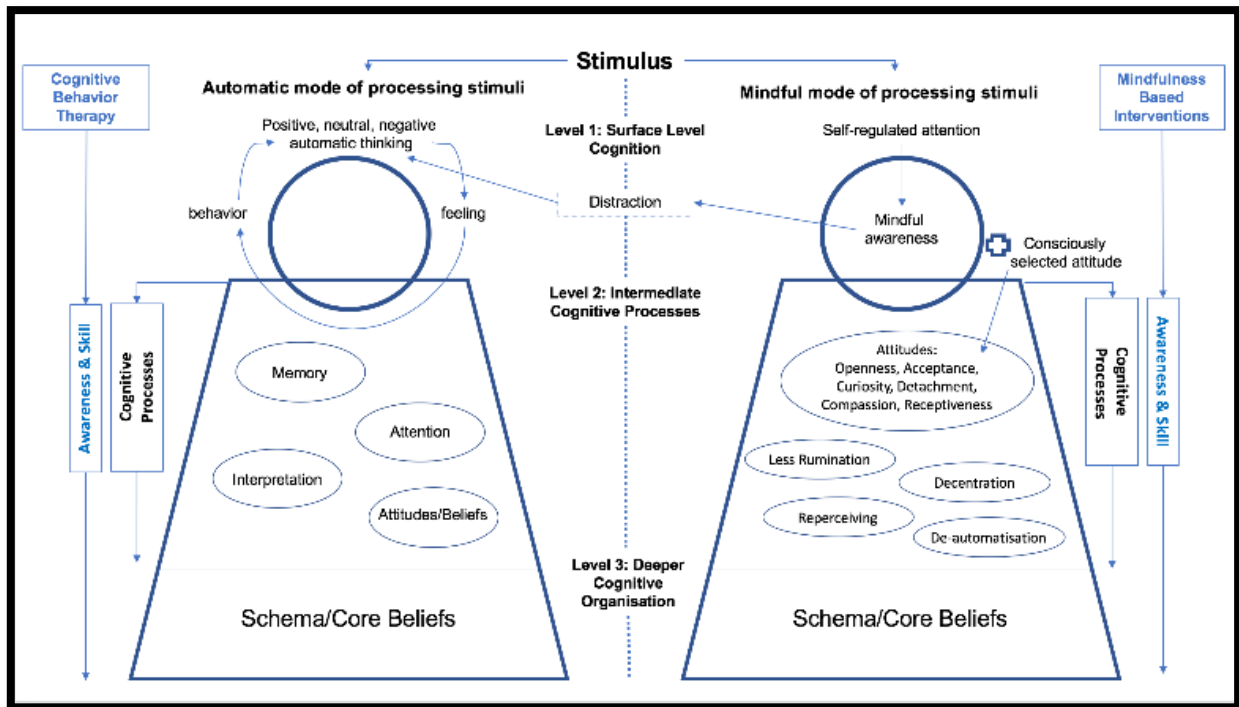


Figure 1. The integrated CBT and mindfulness model in the cCBT computer game Pesky gNATs

Awareness of the relationship between our thinking-feeling and behaviour opens up the possibility of understanding level two of the generic Cognitive Model. Beck describes these as "Intermediate Cognitive Processes" including our memory systems, our attentional processes, our beliefs or attitudes, and how we interpret neutral or ambiguous events or information when we encounter them. The operation of these cognitive processes can maintain mental health difficulties (for example if our memory system has a biased recall of negative past events relative to neutral or positive ones). Insight into how these intermediate cognitive processes work can be gleaned from observing many examples of the relationship between our thoughts, feelings and behaviours. These observations allow us to judge our recall: Do we tend to recall negative events, or negative aspects of events, or is there a balanced positive, neutral and negative aspect to our memory? Do we become attenuated in our attention, focusing on the negative or focusing on solutions that were previously problematic? Or do we operate with an open, flexible attention? What intrinsic attitudes and beliefs are revealed from our thinking, feeling and behaviour? Do they support good mental health or maintain a difficulty? Do we recognise ambiguous or neutral events for what they are, or do we tend to put aside their ambiguity and interpret them in an unhelpful negative manner? CBT usually proceeds by helping us to use many observations of our thought-feeling-behaviour in our everyday life over time to begin to build insight into our secondary cognitive processes, how they contribute to or maintain a mental health difficulty, and how they can be re-directed for self-benefit.

Level Three is described by Beck as a deeper organising cognitive structure he refers to as "Schemas" and the specific content of which he refers to as "Core Beliefs" (Beck, 1964). A schema is the cognitive organising structure of information distilled from our life experience which can be summarised as a Core Belief. It is both the outcome of our past automatised processing of information, and the current and future organising direction of our automatic processing of information. Core Beliefs are such an embedded natural part of our life experience we often simply feel they are true. As such, they have both a cognitive and an emotional component. In terms of our mental health, Beck points to the importance of schemas about our view of self, our view of other people and our view of the world.

Healthy core beliefs are usually balanced recognising both positive and negative qualities. Core beliefs that support mental health difficulty have usually lost that balance and are unrealistically and predominantly negative. For example, an anxious person whose self-schema distils and organises their mind around the idea, “I simply cannot cope,” or a depressed person with the self-schema, “I am just a bad person.” Beck argues CBT allows us insight into key core beliefs that support or maintain mental health difficulties. This insight emerges from making many observations of automatic thinking, feeling and behaviours over the course of therapy. A client and therapist may consider the meaning of many observed thought-feeling-behaviour interactions, and what their commonality reveal of the underlying organisation of information about the self, others and the world. Beck (1977) described three categories of core beliefs associated with anxiety and depression: 1. Helpless Core Beliefs; 2. Unlovable Core Beliefs; and, 3. Worthless Core Beliefs. Examples of each are provided in Table 1. Once identified, these Core Beliefs can also be carefully considered for their validity and utility and when appropriate can be re-crafted into more balanced, more helpful representations of the self, others and the world leading to lasting mental health benefits.

**Table 1: Common core beliefs about the self associated with anxiety and depression**

<b>Helpless Core Beliefs</b>	<b>Unlovable Core Beliefs</b>	<b>Worthless Core Beliefs</b>
I am helpless	I am unlovable	I am worthless
I am powerless	I am unlikable	I am unacceptable
I am out of control	I am undesirable	I am bad
I am weak	I am unattractive	I am a waste
I am vulnerable	I am unwanted	I am immoral
I am needy	I am uncared for	I am dangerous
I am trapped	I am bad	I am toxic
I am inadequate	I am unworthy	I am evil
I am ineffective	I am different	I do not deserve to live
I am incompetent	I am defective so others will not love me	
I am a failure	I am not good enough to be loved by others	
I am disrespected	I am bound to be rejected	
I am defective compared to others	I am bound to be abandoned	
I am not good enough (in terms of my achievements)	I am bound to be alone	

This process of engaging in CBT is represented in Figure 1 by the boxed arrow on the left side of the diagram which characterises it as a method allowing people increased awareness and skill in understanding and shaping how their mind automatically processes and responds to information that may result in, or maintain, mental health difficulty, or may be used for recovery. As such CBT promotes and requires meta-cognition, or thinking about thinking which may lead to behavioural and emotional change. Working with a client involves linked phases of psycho-education about the CBT model, using the model to co-develop an ever-evolving CBT formulation of the client’s difficulties, and the active application of the model by the client to his/her life to manage his/her current difficulties. The client usually moves through related phases of monitoring his/her thinking and its relationship to his/her feelings and behaviour, appraising the validity and utility of the thoughts observed, challenging those thoughts through the generation of alternative thoughts and experimenting with the impact this has on behaviours and emotions. Together clients and therapists also use their many observations of thought-feeling-behaviour examples to generate an understanding of Level Two cognitive processes. Ultimately, the client uses his/her increased understanding of all of the above to identify unhelpful core beliefs and how they support clinical anxiety or depression. With help from his/her therapist, the client challenges dysfunctional core beliefs, replacing them with more evidenced and balanced ones.

Relaxation skills, behavioural activation and more recently mindfulness skills are also routinely an effective part of CBT interventions (Bandelow, Reitt, Röver, Michaelis, Görlich & Wedekind, 2015; Kabat-Zinn, 1982; Richards et al., 2016; Segal, Williams, & Teasdale, 2002). My view is the common active mechanisms through which mindfulness skills offer a helpful addition to CBT across all stress reduction or mindfulness based mental health interventions is they operate through cognitive processing mechanisms that can be understood within Beck's Three Levels of Cognitive Processing Framework.

Figure 1 illustrates this along the right-hand side of the diagram. Rather than an automatic thought-feeling-behaviour processing of information an alternative "mindful" response to the "automatic" processing of stimuli is possible. Along this "mindful" route of information processing Level One represents surface level cognition and is concerned with attention. In this mode when responding mindfully to stimuli we purposely pay attention to it. This is difficult to do unless practiced as our attention tends to switch to other stimuli. In the diagram this switching is represented as "distraction" which returns us to the left side of the model where information processing transfers from a deliberate present moment focus of our awareness to automatic processing and its associated priming of feelings and behaviours.

Consequently, mindfulness exercises frequently aim to help us notice this switching feature of our attention and train or encourage us to return our attention to a current (non-automatic) mindful focus. In the mindful mode of processing we consciously aim to combine our mindful awareness with a deliberately chosen attitude to produce a desired outcome (Shapiro, Carlson, Astin, & Freedman, 2006). In Figure 1 it is represented as "+ consciously selected attitude" to the right of mindful awareness in surface level processing.

We represent the specific intentions themselves as Level Two cognitive processes. During commonly used Mindfulness Based Interventions we intentionally combine attitudes of (1) openness, (2) acceptance, (3) curiosity, (4) detachment, (5) compassion, and (6) receptiveness to the observed content of our mind of to produce an intended cognitive outcome. These cognitive outcomes are (1) less rumination, (2) re-perceiving, (3) de-automatisation, and (4) decentration. These are defined in Table 2. Different mindfulness skills can be used to promote different attitudes and related benefits. For example, "Mindfulness of Objects" (using multiple senses to pay attention in detail to familiar everyday objects) may be used to promote attitudes such as openness and curiosity. While a "Leaves on a Stream" exercise (noticing the emergence and flow of thoughts that pass through our mind while imagining them as leaves floating on a stream) may be helpful to promote the cognitive process of de-automatisation.

Level Three represents our deeper cognitive organisation of information through underlying schema or Core Beliefs. These are similarly open to conscious consideration and re-organisation as part of a Mindfulness Based Intervention. Alternatively, our underlying schemas may re-organise as our mindful awareness and skills develop. The role of Mindfulness Based Interventions is represented in Figure 1 by the boxed arrow on the right side of the diagram which characterises it as a method allowing people increased awareness and skill in understanding and shaping how their mind automatically processes and responds to information that may result in, or maintain, mental health difficulty, or may be used for recovery. Mindfulness based interventions promote meta-cognition.

**Table 2:** Core concepts in understanding the potential mechanisms of change in mindfulness based interventions.

Outcome	Definition
Rumination	Automatic recurring attention on thoughts and feelings of distress and their possible causes, circumstances or consequences without resolution.
Reperceiving	Deliberately focussed attention producing awareness of the present moment intentionally combined with attitudes of curiosity, compassion, and open-heartedness, even in response to negative stimuli that lead to positive outcomes through self-regulation, clarification of values, and cognitive, emotional, and behavioural flexibility.
De-Automatisation	Deliberately focused attention producing awareness of the present moment intentionally combined with acceptance to promote less habitual reaction, increased cognitive control, greater meta-cognitive insight, and fewer tendencies towards thought suppression and distortion.
De-centration	Deliberately focussed attention producing awareness of the present moment intentionally combined with an open receptive attitude resulting in increased awareness that currently perceived events are in essence temporary, alterable and subject to inevitable passing.

It is hoped that this outline of the theory and practice of CBT provides clarity about how it is so effective but also reveals the significant difficulties in making this model accessible to children. The primary developmental difficulty for CBT with children is that in essence it is a metacognitive process. It requires us to think about our thinking, to think about how our thinking effects our feelings and behaviour, to think about whether our thinking has a previously unnoticed unhelpful negative bias and how this effects our feelings and behaviours, to think about alternative more evidenced or helpful ways of thinking, how these effect our feelings and behaviour, and to ultimately identify some super thoughts or Core Beliefs that are an organising centre for our difficulties, which in turn we need to appraise and challenge. As such, CBT is developmentally challenging to children whose cognitive development may not include a ready capacity for metacognition.

Our team is involved in an on-going research project to design computer games and apps that make CBT concepts more accessible to those who may struggle to understand them, including children and adults with an intellectual disability. In doing so we draw on ideas from clinical psychology, developmental psychology, and learning theory. Mental health professionals can access online training and our computer games on a not-for-profit basis through our website [www.PeskyGnats.com](http://www.PeskyGnats.com). One of our main aims in combining technology with CBT is to use it to address the developmental unsuitability of CBT and make the model more accessible and understandable to children. In the next section of this chapter I will describe how we have used ideas from developmental psychology and social learning theory to translate the complex meta-cognitively oriented ideas of CBT into something much more accessible to children in a computer game called *Pesky gNATs!*

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## INTEGRATING DEVELOPMENTAL PSYCHOLOGY AND LEARNING THEORY INTO THE DELIVERY OF CBT FOR YOUNG PEOPLE

Piaget's theory of cognitive development gives us guidance on the age we would expect children to begin to engage in the kind of abstract meta-cognitive thinking associated with the successful application of CBT (Flavell, 1963; Piaget, 1970; Piaget & Inhelder, 1969). Piaget outlined a theory of child cognitive development where the concept of an organising schema is central. Piaget describes children as engaged in a process where they assimilate knowledge into existing schemas and accommodate to new knowledge by altering schemas as they progress through

qualitatively different stages of thinking. Piaget argues that children's cognitive development begins in a sensorimotor stage (0-2 years) where they learn about the physical properties of the world by interacting with it. This is followed by a pre-operational stage (2-7 years) where children begin to develop an internal mental representation of the world. This stage is associated with the development of language, symbolic representation, imaginative play, and theory of mind. Although children at this stage develop an understanding of other's minds, they struggle to see the world from others' perspectives, are magical in their thinking, and find it hard to focus on more than one dimension of a problem at a time. The third level in Piaget's model is the concrete operational stage (7-12 years). Here children develop the use of logic to solve concrete problems and better grasp the perspectives of others. Finally, Piaget describes a formal operational stage (12 years onwards) where children's thinking becomes more abstract and hypothetical, although not all children achieve this (Bridges & Harnish, 2015).

If we were to apply Piaget's model to guide us on the correct time to offer CBT to children we might conclude that it is during the formal operational period which for most young people is from roughly 12 years onwards. The abstract CBT tasks of noticing thoughts, considering their evidence, generating alternative attributions, experimenting with new ways of thinking, and identify and challenging core beliefs fits well with this phase of the Piagetian model.

Vygotsky (1978) suggests we should usefully distinguish between the cognitive accomplishments of children when they think independently from when they think with assistance from adults or more advanced peers. He argues that we can assist children to be more cognitively accomplished when we provide them with educational and teaching support that takes account their current level of skill and proximity to more advanced types of thinking. He refers to this as *scaffolding* the child's educational experience within their *Zone of Proximal Development* (Daniels, 2017). (See Bierer chapter for a more detailed discussion of scaffolding.) Applying Vygotsky's theory opens the possibility that we could consider whether children younger than 12 might benefit from a CBT approach if we appropriately scaffold it within their zone of proximal development. This could be achieved through a concrete description of CBT concepts in a psycho-educational context where the child is supported in thinking through the application of CBT to their everyday life and current difficulties by a cognitively more advanced adult, such as a suitably qualified mental health professional.

The work of developmental psychologists such as Donaldson (1978) and Dunn (1988) argues that Piaget's model was broadly correct but under-recognises the important role of social context in supporting more sophisticated thinking among children. That is, when children are presented with cognitive problems in a meaningful social context are more sophisticated in their thinking than Piaget's model allows. They support this view through observation and experimental work (Donaldson, 1978; Dunn, 1988). This suggests that a further part of the scaffolding that makes the concepts of CBT more accessible to younger children is to introduce them through a medium that presents them in a naturalistic social context.

Bandura (1971; 1977) also offers us an understanding of how children learn in a social context. He theorises that while many new patterns of behaviour are learnt from operant conditioning, they can also be learnt through observing the behaviour of others. Learning through observation is mediated in Bandura's theory by cognitive processes. That is, we observe the behaviour of others and its consequences and we think about these observations and use our thinking to guide our behaviour. As Bandura puts it, "Man's cognitive skills thus provide him with the capability for both insightful and foresightful behavior" (1971, p.3). Bandura describes four requirements of observational learning: 1. Attention to essential features of the model's behaviour; 2. Retention in memory of the model's behaviour so it can be replicated in the absence of the model; 3. Motoric reproduction of the behaviour symbolically represented in memory; and, 4. Reinforcement and motivation for the behaviour's retention.

Our approach in development of *Pesky gNATs* was to take the CBT model developed by Beck and blend it with these ideas from Piaget, Vygotsky, Donaldson, Dunn and Bandura within a computer game to make it accessible to children 7 years and older. We have used the technology of computer games and apps to fully integrate these ideas with each other and make them accessible to young people and their families. The next section describes the format and content of *Pesky gNATs*.

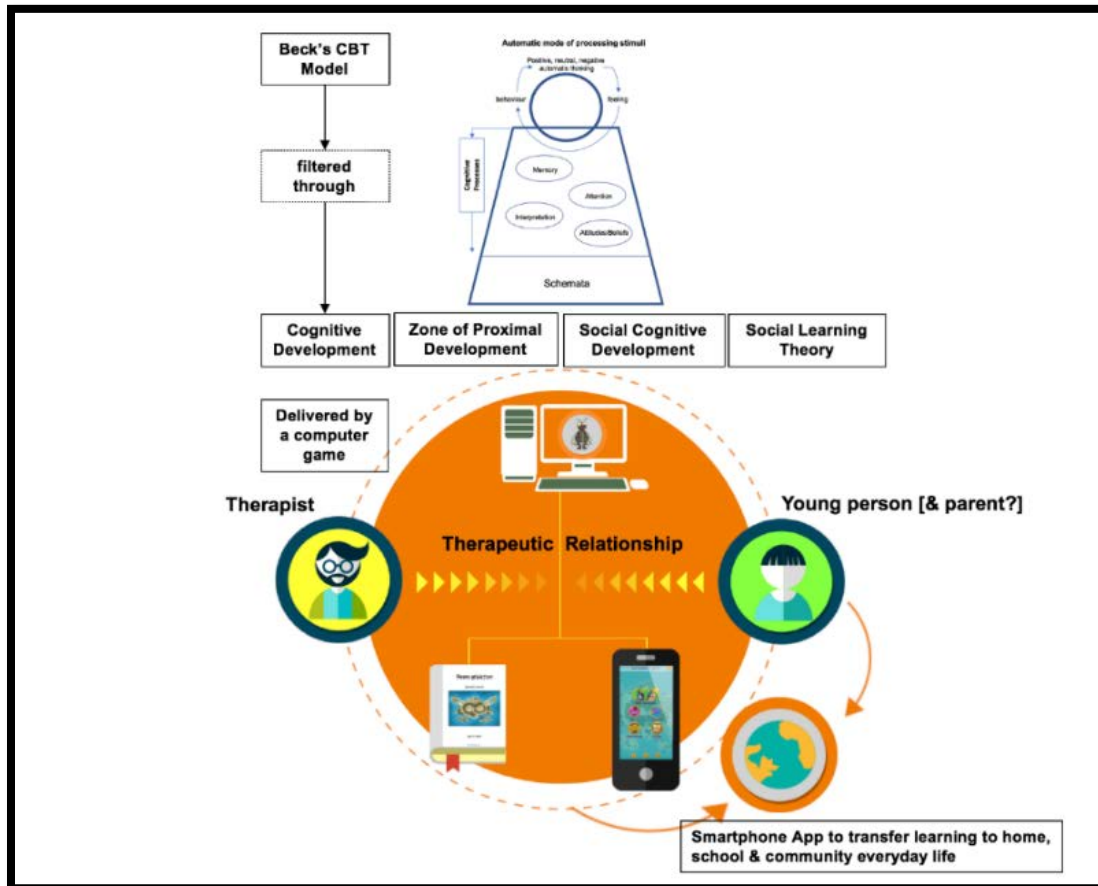


Figure 2: The integration of CBT with developmental psychology and learning theory in the *Pesky gNATs* computer game and app

## USING TECHNOLOGY TO TEACH CBT TO CHILDREN

*Pesky gNATs* is a 3-D computer game that teaches young people CBT concepts and skills (see figure 3; O' Reilly & Coyle, 2015a). The *gNATs* of the game's title is a play on the CBT concept of NATs (Negative Automatic Thoughts). The game is played by young people with clinically significant anxiety or low mood during traditional therapy sessions with a suitably qualified mental health professional. The game is supplemented by a *Pesky gNATs* smart-phone app that supports a young person's transfer of what they learn in therapy to his/her home, school and community life (See figure 3) (O' Reilly & Coyle, 2015b). Our aim in the development of *Pesky gNATs* was to combine the highest quality evidence-based psychological content for mental health difficulties experienced by young people, with the highest quality purposely designed gaming technology, delivered on a sustainable not-for-profit basis. *Pesky gNATs* and seven hours of online training are available to mental health professionals on a not-for-profit basis through our website [www.PeskygNATs.com](http://www.PeskygNATs.com). The training videos provide professionals with a description of the concepts of the programme and a walk-through of the full content of the game and app, illustrating how they are typically used

during therapy. Our intention with *Pesky gNATs* is to assist mental health professionals in their delivery of a genuinely “cognitive” CBT intervention filtered through the ideas of developmental psychology and learning theory, packaged within a computer game played within the supportive context of a therapeutic relationship.

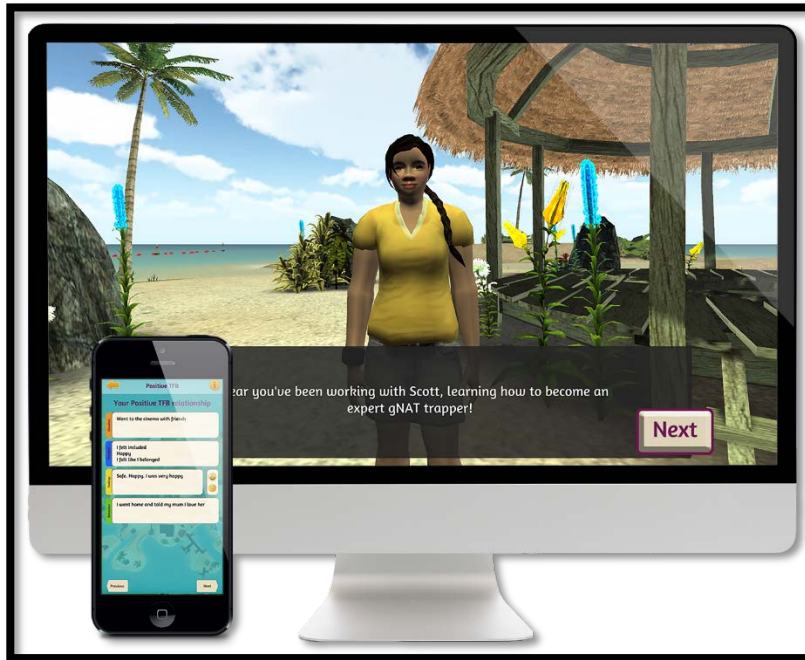


Figure 3 The *Pesky gNATs* computer game and Smartphone App

Drawing on Piaget's theory of childhood cognitive development, a key aim in our design was to make CBT ideas more concrete. We attempted to do this in the two ways. Firstly, we use concrete ratings of the child's current psychological functioning through-out the game. *Pesky gNATs* begins with the completion of a standardised rating scale of anxiety and low mood (*The Revised Children's Anxiety and Depression Scale*; Chorpita, Yim, Moffitt, Umemoto, & Francis, 2000). Once completed it is scored, profiled and displayed instantly to the young person. This allows the young client and his/her therapist to see how his/her anxiety or low mood compares to other similarly aged young people. This information is then used to plan intervention goals. Each level of the game also allows young people to complete a four-item rating scale of their everyday functioning in the areas of personal, at home, at school and overall (*The Children's Outcome Rating Scale*; Miller, Duncan, Brown, Sparks, & Claud, 2003). Week-by-week this allows young clients and their therapists to monitor how their difficulties impact these important aspects of life, monitor progress and plan intervention goals for each session. Every level concludes with a similar four-item rating scale that allows the young person to give feedback on each session in terms of the quality of the therapeutic relationship, goals, approach and overall rating of the session (*Children's Session Rating Scale*, Miller & Duncan, 2000). This informs the therapist about the young person's engagement with the intervention and allows both to judge together if they are on-track or need to adjust their work to better engage the young person in the programme.

Secondly, we use the seven levels of *Pesky gNATs* to unfold a concrete metaphor to make the ideas of CBT more accessible (see Table 3). The game begins by introducing children in level one to the idea that thoughts-feelings-and-behaviours go together. They learn that some thoughts are unhelpfully negative. The NATs (Negative Automatic Thoughts) of CBT are equated to gNATs or little flies that can sting us, affect our feelings and behaviour without us

noticing. Game levels two and three proceed by teaching young people CBT skills embedded in this unfolding concrete metaphor. "Cognitive Monitoring" in the game becomes learning how to set a gNAT trap. Different types of negative thinking are explained as different species of gNAT the player explores through the gNAT gallery. In game level four, "Cognitive Restructuring" becomes learning how to swat gNATs using four gNAT swatting questions. In level five, identifying underlying core beliefs is pursued by hunting all of the trapped gNATs back to their Hive. The young person learns that "Unhelpful Hives" have a common idea expressed in different ways by the gNATs who come from there. They review all of the thoughts recorded up to that point in the programme and return them to the Unhelpful Hive they come from. Young people are presented with examples of typical Unhelpful Hives (core beliefs) to assist them. In game level six, challenging unhelpful Core Beliefs is presented as a "Hive Splatting" exercise where the young person with help from his/her therapist carefully considers the evidence for and against the identified core beliefs. Developing a more balanced understanding of self, others and the world is achieved by building a more balanced and realistic "Bee Yourself Hive." For example, "I worry more than I need to because I care about people. I have many skills and supports to help me. I can cope very well when I need to." The final level of the game helps young people develop relapse prevention skills by building a six-part Healthy Life Plan (See figure 4).

**Table 3:** CBT Content of *Pesky gNATs* (O' Reilly & Coyle, 2015a).

Game Level	Central CBT Concept
<b>Game Level 1:</b> Thoughts Feelings & Behaviours	<b>Session concept:</b> Thinking-Feeling-Behaviour (TFB) go together. Young person with assistance from therapist creates a positive and a negative TFB from the last 24 hours. Between session task to record one positive and one negative TFB.
<b>Game Level 2:</b> Cognitive Monitoring	<b>Session concept:</b> Some thoughts are unhelpfully negative and we usually do not notice them. Negative Automatic Thoughts (NATs) animated as gNATs or little flies and young person reviews 6 different types (species) of gNATs and learns how to record them using a gNAT trap. Young person reviews their negative TFB to see if it contains a gNAT. Between session task to trap some gNATs focusing on times of anxiety or low mood.
<b>Game Level 3:</b> Cognitive Monitoring	<b>Session concept:</b> Young person is introduced to 5 more common species of gNAT. They review their gNAT trapping to-date. Young person responds to their gNATs with some PATs (positive automatic thoughts). Between session task to trap some more gNATs focusing on times of anxiety or low mood.
<b>Game Level 4:</b> Cognitive Restructuring	<b>Session concept:</b> Introduction of cognitive restructuring presented as gNAT swatting. Young person applies four gNAT swatting questions to (i) consider evidence for and against their thoughts, (ii) to consider alternative ways of looking at things, (iii) to brainstorm alternative plans for similar situations and (iv) to pick and test a new plan. Between session task to trap and swat gNATs focusing on times of anxiety or low mood.
<b>Game Level 5:</b> Negative Core Belief Identification	<b>Session concept:</b> Introduction of negative Core Beliefs and review of common examples. Young person gathers up all of the gNATs they trapped so far and hunts them back to a suitable Hive (Core Belief). Between session task to hunt gNATs back to a Hive.
<b>Game Level 6:</b> Negative Core Belief Re-appraisal.	<b>Session concept:</b> Socratic questioning of identified core belief. Young person considers evidence for and against their core belief in the areas of self, family, school, friendships and other. Young person decides if Core Belief is true or not (Hive splatting) and builds a positive belief called a Bee Urself Hive. Continued as a between session task.
<b>Game Level 7:</b> Relapse Prevention	<b>Session concept:</b> Relapse prevention. The young person identifies signs of relapse and plans their response. The young person also develops a healthy life plan setting positive goals in the areas of 1. Fun 2. Personal Goals 3. Having a Purpose 4. Emotional and Physical Health 5. Being Me. 6. Having People in My Life.



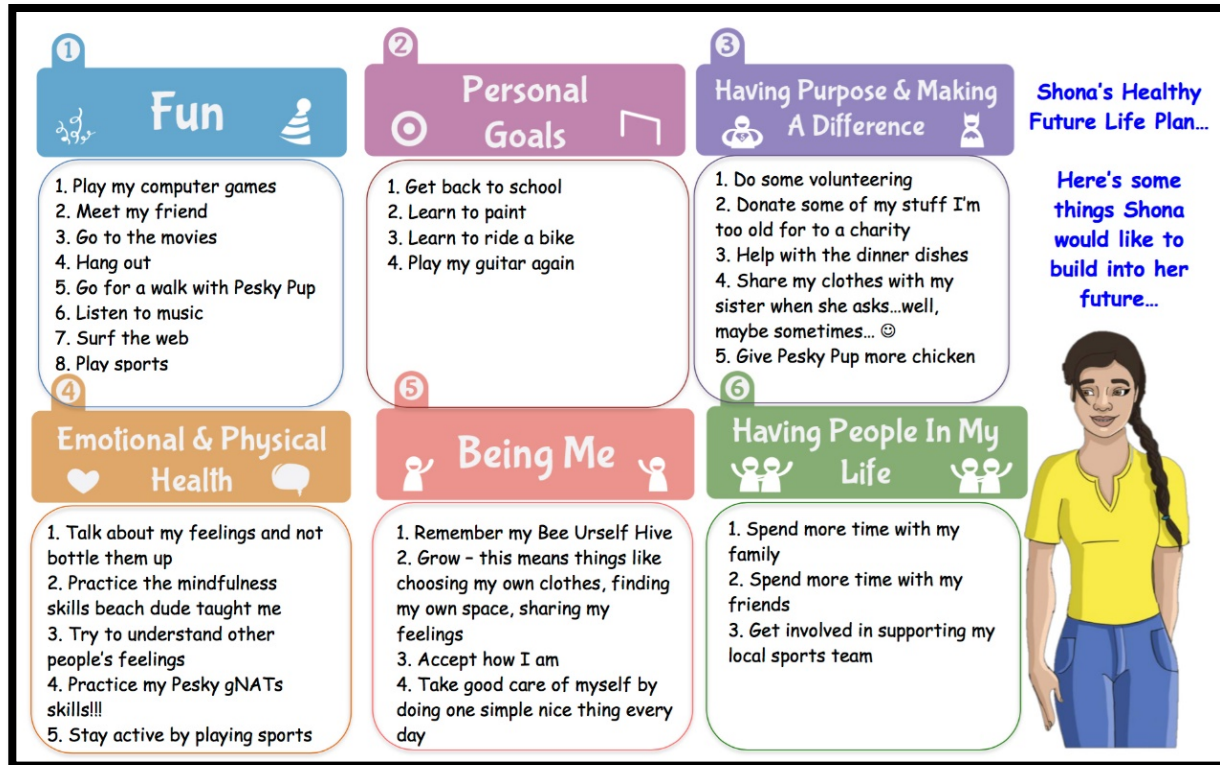


Figure 4: An example of a Healthy Life Plan developed in level 7 of Pesky gNATs.

In developing *Pesky gNATs* we also wished to give therapists and young people the option of incorporating behavioural activation, relaxation and mindfulness skills into the intervention. We did this by introducing a game character, called Ben the Beach Dude, who young people can choose to visit at the end of each level of the game. This character gives young people the option to choose an activity scheduling, relaxation or mindfulness skill to learn and practice. They are presented in an open format choice with all options available in all levels so the young person and their therapist can select an appropriate skill for the young person given their needs at that moment in time and stage of the intervention. The content of the Beach Dude Character are described in Table 4.

**Table 4:** *Relaxation, Mindfulness & Activity Scheduling Content of Pesky gNATs (O’ Reilly & Coyle, 2015a, 2015b).*

Skill	Description
<b>Awareness of your body</b>	
1. <i>Paced breathing</i>	A self-regulatory breathing exercise. The player tries different paces for breathing-in, holding their breath, and breathing out. They reflect on their physical experience of pacing their breathing and changing their breathing. Aims to increase awareness of your breathing and physical self-regulation.
2. <i>Relaxation</i>	A progressive muscle relaxation exercise. The player works their way around their body tensing and releasing muscles noticing their experience as they do so. They also engage in some relaxation visualization. The aim of this skill is also self-regulation and anxiety/stress relief.
3. <i>Body Scan</i>	A mindfulness exercise. The player deliberately and progressively moves their attention from the tips of their toes to the top of their head. The aim is to increase physical awareness.
<b>Awareness of your mind</b>	
4. <i>Leaves on a stream</i>	A mindfulness exercise. The player imagines they are sitting on the bank of a stream watching leaves flow past. They begin to notice their own thoughts and imagine placing each thought on a leaf on a stream and allow it to flow on and wait to observe the next thought that comes along. The aim is to notice and refocus shifting attention, increase awareness of thoughts and awareness that they are passing events.
5. <i>What’s on your mind</i>	A mindfulness exercise. This skill builds on the awareness of thoughts and their passing nature introduced in leaves on a stream. The player watches a visual display that lists thoughts, imaginings, judgments, memories, feelings, and other things. As they notice one of these things on their mind they acknowledge their awareness of it and allow it to pass. The aim is to notice and refocus shifting attention, to increase awareness of the content of your mind and its transitory nature.
<b>Awareness of your world</b>	
6. <i>Mindfulness of sounds</i>	A mindfulness exercise. The player listens to the sounds they can hear for one minute. They are invited to notice the difference between the sound they hear and the label/judgment our mind makes of that sound. For example notice that I heard the sound “tweet-tweet” rather than report the label my mind offers (birdsong). The aim is to increase awareness of the world, to notice and refocus shifting attention, and to observe non-judgmentally.
7. <i>Visual illusion</i>	A cognitive perspective exercise. The player views a single image that some people see as the head of a native American warrior while others see it as the full body of a person who lives in the Arctic. The aim of the exercise is to become aware that how we see something depends on how we observe it and different people can observe different things while looking at exactly the same picture.
8. <i>Mindfulness of an object</i>	A mindfulness exercise. The player uses all of their physical senses to observe something everyday and familiar. The aim is to pause and observe in detail something we usually do not take time to pay attention to.
<b>Activity Scheduling</b>	
9. <i>Activity scheduling</i>	An activity scheduling exercise. The player plans activities for the week ahead and reviews their completion by rating each activity for its sense of mastery and pleasure.

The design of our programme is also influenced by the post-Piagetian research that emphasises the supportive nature of social contexts for children's thinking. Computer games afford a wonderful opportunity to support the understanding of CBT ideas within a social story. *Pesky gNATs* uses the following social narrative. The player selects a friendly, young person avatar to represent them in the 3-D gameworld where they travel to gNATs Island, a distant tropical world where gNATs come from. There they meet a world famous explorer called David gNATtenborough who

thinks gNATs are so extraordinary that he set up the world's first gNAT lab in order to study them. He invites the player to help him and his team of researchers. The young person meets the different members of David gNATenborough's team across the various game levels of the programme as they learn how to trap gNATs, identify different species of gNAT, swat gNATs, hunt them back to their Hives, and splat Unhelpful Hives. In this way, the computer game world and its story provide a supportive narrative backdrop for the young person's grasp of complex CBT concepts.

We used Vygotsky's concept of a scaffolded Zone of Proximal Development to further help young people. For this reason, we have designed a game that is not played independently or online. Instead, the game is played by a young person with clinically significant anxiety or depression with a suitably qualified mental health professional during regular therapy session. Each level of the game is designed to take about 50 minutes to play, which is the typical length of therapy sessions. Young people play the game with their therapist to allow them to benefit from their therapist's understanding of CBT concepts and their application. The therapist discusses and further explains the ideas presented in the intervention and helps the client think through and apply them to his/her current difficulties. For children aged 7-9, we recommend the game is played by a therapist with a young person and a parent or caregiver. For those aged 9 and older, it is increasingly suitable for the therapist to play with only the young person. This blending of a game with discussion between a young people (and parent) and a therapist allows a very nice combination of integrity of programme delivery combined with appropriate idiosyncratic individual flexibility. That is, the game characters are programmed to deliver the concepts of the programme as we intended and the discussion of these concepts by young people with their therapist allows their modification and application with the personal nuance that every individual's life will require.

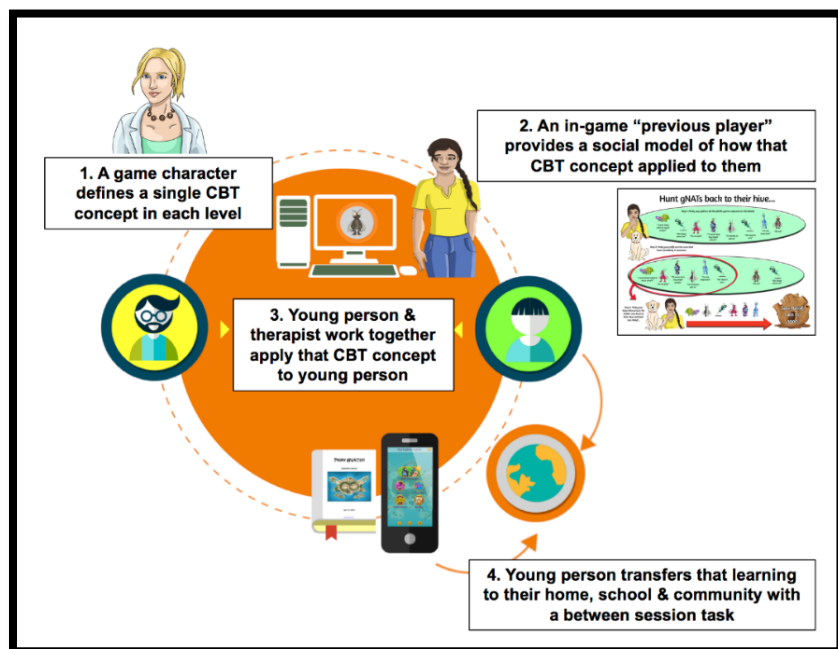


Figure 5: The social learning theory structure repeated in each Pesky gNATs game level

We used Bandura's (1977) model to inform the design of each game level. The same structure is used in every game level to offer a social learning theory informed presentation of content (see Figure 5). In every level of the game a character introduces a single CBT concept that is the main idea of that level. The concept is then modelled for the young person with reference to the experience of a fictitious previous player who illustrates how the idea applied

to him/her. The game characters then ask the young person to consider how this idea applies to his/her own difficulties. The young person must discuss this with the therapist he/she is working with and together they figure out its application for the young person. The young person then explains to the game characters how it applies to him/her. The game characters reply by inviting the young person to put the idea into practice until their next appointment using the Pesky gNATs smartphone app or hard copy workbook. The smartphone app is described below and is intended to aid Bandura's conditions for social learning. That is, it helps young people to attend to the key features of the behaviour to be modelled, it aids recall of the content, it assists in converting his/her understanding of the model into behavioural action, and it rewards the use of the model by unlocking fun games within the app when the young person completes between session therapy tasks.

The *Pesky gNATs App* is available for free in iOS and Android formats and is downloaded to a smartphone or tablet device by a young person (O' Reilly & Coyle 2015b). The content requires an unlock code to open and this is provided to the young person by the therapist. It is designed to support young people to complete between session tasks for every level of the game. The young person uses it to (1) notice his/her thinking-feeling-and-behaviour going together; (2) to trap gNATs and identify the species of gNAT recorded; (3) to swat gNATs; (4) to hunt gNATs back to their Hives; (5) to splat Hives; (6) to build Bee Yourself Hives; and (7) to develop and apply a healthy life plan. These activities are the between session therapy tasks for young people as they complete the programme. They allow young people to apply and practice the CBT skills they are learning to their life and record the outcome which they can share with their therapist during sessions. The full content of the Pesky gNATs App is outlined in figure 6.

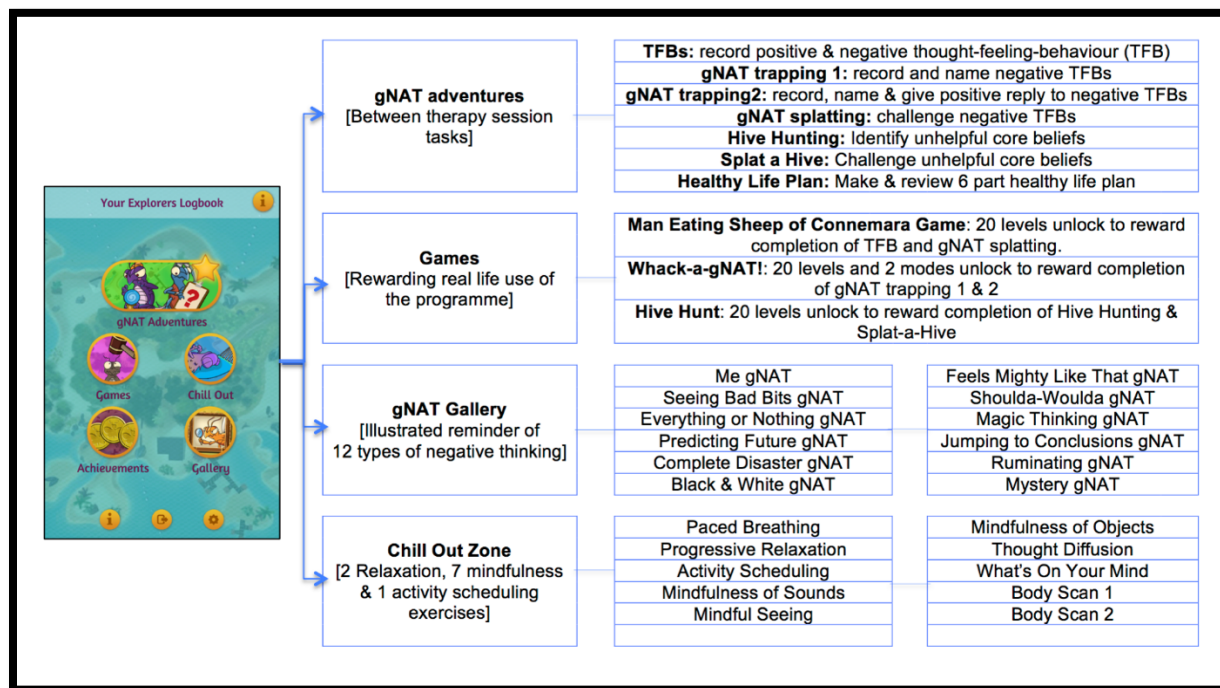


Figure 6: The content of the Pesky gNATs App designed to support transfer of CBT skills and knowledge to home, school and community life.

## EVIDENCE

We are engaged in the on-going evaluation of the technology based programmes we develop. This began with pilot studies that demonstrate that children with clinically significant anxiety or low mood attending mental health

services, or working in educational settings with school psychologists, benefit from our programmes (Chapman, Loades, O' Reilly, Coyle, Patterson, & Salkovskis, 2016; O'Dwyer-O'Brien, 2012; Ryan, 2013). We also conducted experimental studies to establish that children learn mindfulness and relaxation skills by using our technology (O' Reilly, Coyle, & Tunney, 2016; Tunney, Cooney, Coyle, & O' Reilly, 2017). Most recently we reported a randomised control trial of a version of *Pesky gNATs* for adults with an Intellectual Disability who have clinically significant anxiety, demonstrating post intervention clinical improvement maintained and increasing at three month follow-up compared to psychiatric treatment as usual (Cooney, Jackman, Coyle, & O' Reilly, 2017).

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## CONCLUSIONS

This chapter outlines our approach to using the educational potential of technology to teach young people about their mental health and to make the approach of CBT more accessible to them. We have described how CBT is effective in the treatment in of the most common mental health problems such as anxiety and depression. We identified that the successful application of CBT requires metacognition. This makes it developmentally challenging for children. We described the ideas from developmental and clinical psychology that we feel help young people bridge their position from earlier more concrete stages of cognitive development to the more advanced abstract thinking required for the successful application of CBT. We have used the technology of computer games and smartphone apps to integrate CBT with these ideas and make them available to young people and mental health professionals on a not-for-profit basis. We plan to continue to develop this integration of the instructional potential of computer games and apps with evidenced based mental health interventions for a range of disorders and therapeutic approaches.

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# ONLINE ACTIVITIES FOR TEACHING STUDENTS ABOUT TECHNOLOGY, DISTRACTION, AND LEARNING

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## INTRODUCTION

Both inside and outside of academia, multitasking with technology has been a concern among faculty, students, and the general public (Carr, 2010). Divided attention has become a common feature of contemporary life, with all kinds of tempting media just a click away even as we attempt to carry out our everyday activities—such as working, reading, driving, and learning. The issue is especially concerning for college teaching, with numerous faculty raising concerns about chronically distracted students and their inability to concentrate, which is a prerequisite for learning at the college level (see, e.g., Lang, 2017; Miller, 2014, 2015; Straumshein, 2015, and the Hall and Lineweaver in this eBook). Faculty are right to be concerned, given the array of studies reporting negative impacts on academic performance associated with using devices for non-educational purposes in class (Conard & Marsh, 2014; Ellis, Daniels, & Jauregui, 2010; Junco, 2012; Junco & Cotten, 2012.; Wood et al., 2012).

Digital distraction among college students is a problem that psychology is well positioned to address. We psychology teachers do, in fact, address it; typically, attentional limitations are explicitly covered in the psychology curriculum, including the introductory course as well as specialized courses in cognition. However, even these well-placed efforts may not reach enough students, or reach them soon enough. Specialized cognitive courses, the ones with the most content directly relevant to attention, attract only a narrow segment of the student population and are generally geared to students who are already a year or more into their college careers, after the critical first semester or two when the academic experience is critical for persistence and success (Tinto, 2012). Introductory courses do engage a much broader swath of students, many of whom are first-year students, but the content on attention and distraction is usually folded into a more general chapter on consciousness, which is itself only one chapter among 12 or more covered within the course (see, e.g., Myers & Dewall, 2016). Regardless of the level of the course, another concern is that the research-oriented approach that is appropriate for a college psychology course may not be engaging to a broader audience of college students, and might emphasize theory or research findings more than the practical goals of changing attitudes and behaviors relevant to everyday life.

Taking such a practical approach is important, because simply disseminating information, even very convincing and compelling information, is insufficient for producing behavior change. It is a near-universal truth that we can know all the reasons for making a given choice and still find ourselves struggling to make it. The literature on intentional behavior change (DiClemente, 1993; Norcross, 2012; Prochaska, DiClemente, & Norcross, 1992) illustrates this gap between knowledge and behavior, showing how behavior change is a complex process involving multiple stages, from pre-contemplation to preparation to long-term maintenance, and one in which relapses are likely even among motivated individuals. In short, producing substantive change in a problematic behavior such as using distracting technology in class takes much more than simply informing people about a body of research.



Another reason why reading or hearing a lecture about distraction may not be effective is that it may not be memorable. By contrast, multimedia and interactive demonstrations can illustrate psychological principles in a vivid, compelling, and thus lasting way. Later in this chapter, we will offer specific examples from the present project, but in general, by interactive and multimedia demonstrations we mean materials that are designed to induce and thereby illustrate psychological phenomena, often by incorporating a task or challenge or eliciting responses to perceptual stimuli. For example, there are a number of freely available online demonstrations of the McGurk effect, an illusion in which seeing lip movements alters perception of ambiguous speech sounds; one can be found here: <https://www.youtube.com/watch?v=PWGeUztTkRA> (Mittton & Aviner, 2011). The McGurk effect, which is important for understanding how multiple sources of information combine during speech perception, is difficult to explain with text alone, but easy to illustrate with the aid of a compelling multimedia demonstration in which the viewer/listener actually experiences the effect. Other demonstrations take the approach of having the participant input responses, again to give a subjective sense of what a phenomenon or experimental paradigm is like and to build conceptual understanding. Examples include this online demonstration of the lexical decision paradigm, [http://www.psytoolkit.org/experiment-library/experiment\\_ldt.html](http://www.psytoolkit.org/experiment-library/experiment_ldt.html), or online versions of the implicit association test (IAT) available through Harvard University's Project Implicit, <https://implicit.harvard.edu/implicit/selectatest.html>.

Engaging with these kinds of materials can be broadly categorized as a form of active learning. Taking this kind of active-learning approach is likely to be more memorable, and thus more effective, than simply informing students about facts drawn from psychology research (see Benjamin, 1991, for contrasts between active learning and traditional lecture approaches in psychology courses). Fortunately, there are many multimedia demonstrations such as those described above readily available online. However, these online resources – especially those produced primarily for entertainment – have to be chosen cautiously, as they may get the underlying science wrong in ways that are not immediately apparent to the non-expert viewer. One YouTube video, for example, presents viewers with a perception challenge involving ambiguous figures and photographs, claiming that “the faster you can see the images and switch between them, the quicker your brain works,” which is not supported by evidence (<https://www.youtube.com/watch?v=CYD8zRDae1I> ; Mind Oddities, 2017) Another purports to type viewer's personalities according to behaviors such as how they carry a handbag or whether they leave dirty dishes overnight (<https://www.youtube.com/watch?v=ww3X5uHGKks> ; BRIGHT SIDE, 2017). Similarly, numerous online versions of the Myers-Briggs personality test have proliferated, despite concerns about the unscientific nature of the Myers-Briggs framework (Grant, 2013; McCrae & Costa, 1989). In sum, freely available online multimedia has great potential to promote understanding of psychological phenomena, but given the substantial variability in quality, it works best when selected and contextualized by an expert.

In the present project, our goal was to promote understanding of the relationship between attention, memory and learning, as well as elicit reflection and planning about how students can manage digital distraction, in a fully online format emphasizing interactive multimedia demonstrations and active engagement. To this end, we developed the *Attention Matters!* module, which is now in use at our institution, Northern Arizona University, as an educational resource that our students can complete free of charge. In designing *Attention Matters!*, we strove to incorporate memorable, engaging demonstrations of psychological phenomena, coupled with brief, informal content presentation, used to springboard discussion and reflection.

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## DESIGN FEATURES OF ATTENTION MATTERS!

As the module came together it was clear that we needed to have a high degree of control over students' interaction with the content. Therefore, a major design feature was to selectively release content to participants based on what they completed. This led to the decision to create three units for students to complete – and that progression through the module necessitated the completion of all activities in each unit.

The first task in the module is a pre-assessment (discussed later) that, once completed, allows access to the first unit, What Do You Know about Attention? The unit introduces students to core concepts in attention and distraction through a series of activities that draw on freely available YouTube videos and web sites that we selected. (Appendix A gives a list of links to these resources and to the *Attention Matters!* faculty guide.) The unit progressively releases content based on students' self-identifying that they have watched the video or visited the web site and completed the activity. We discuss some of the resources later. While completing the activities some original explanatory content is also released to the students that discusses some of the science of what they have done. This then releases a reflective asynchronous discussion moderated by a cognitive psychologist (the first author). They then complete the unit by taking a brief quiz with built-in feedback. Completion of the quiz opens the next unit, What Happens When We Overload Attention?, which follows the same format. The last unit, What's Your Plan?, is somewhat different as it focuses on asking students to develop a plan for managing attention. Students are allowed multiple attempts to complete the end of unit quizzes. Completion of the entire module earns a badge and a certificate of completion.

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## HOW ATTENTION MATTERS! TEACHES CONCEPTS IN ATTENTION, MEMORY AND LEARNING

We chose several phenomena having to do with attention, memory, and learning to use as demonstrations. In choosing these, we sought effects that were robust and striking, and that would work well in a fully online environment. Most of these will be very familiar to psychologists, and thus we have described in detail only one - the *visual cocktail party effect* - that is less common.

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### VISUAL COCKTAIL PARTY EFFECT

This demonstration taps into the classic research finding that unattended auditory information will, under certain circumstances, enter conscious awareness. In particular, one's name will be consciously perceived even on an unattended channel (Moray, 1959).

The classic procedure, which involves a binaural shadowing paradigm, is not practical to carry out within an unsupervised online module. However, the first author has adapted for class use a visual version of the phenomenon, invented by a former student for a class project (Drummond, 2002; see also Wolford & Morrison, 1980). In it, alternating lines of text are presented, one line in bold and one in regular typeface. Participants are instructed to read only the bold text, ignoring the rest. The bold text contains innocuous wording about how attention works, and thanks the participant for reading the text. The light-faced type, i.e., the *unattended* verbiage, contains a variety of potentially attention-grabbing words such as *sex*, *murder*, *911* and mentions a number of names which we put together from a list of first names that are currently the most frequent among traditional-aged college students.

The intended result is that participants will read the attended, bold-face text, but, the more emotionally charged words and potentially, if it is present, one's own name, will intrude into conscious awareness. This illustrates how

we process a great deal of environmental stimuli but do so outside of conscious awareness, and that we are not always in control of where our attention is directed from moment to moment.

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### CHANGE BLINDNESS

We incorporated change blindness into *Attention Matters!* into the first unit with an embedded video called *The Amazing Color Changing Card Trick* (Wiseman, 2012). Created by psychologist Richard Wiseman, the video misdirects viewers' attention toward an underwhelming card trick involving red and blue cards, while in the meantime, unattended parts of the scene undergo major changes. The video is then replayed with the changes highlighted.

This phenomenon involves attempting to detect changes in a visual scene. Frequently, when attention is disrupted or attracted elsewhere – for example, by the introduction of a flicker between changes, or patterned “mudsplashes” that flash over the scene – these changes escape detection, even when they occupy large swaths of the visual field (O'Regan, Rensink, & Clark, 1999; R. A. Rensink, O'Regan, & Clark, 1996; Rensink, O'Regan, & Clark, 2000; Ronald A Rensink, 2002).

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### STROOP EFFECT

We incorporated the Stroop effect (Stroop, 1935) in the second unit by directing students to click on a link to an online demonstration of this effect (<https://faculty.washington.edu/chudler/java/ready.html>). Notably, this particular Stroop effect demonstration includes a version of the task that is accessible to colorblind individuals, modeled on a picture-word interference task; in this alternative version, participants read animal names superimposed on conflicting pictures (e.g., the word “cow” superimposed on a picture of a chicken).

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### MEMORY FOR A COMMON OBJECT

We incorporated this phenomenon by directing participants to draw a penny on scratch paper, then to describe any inaccuracies in the associated discussion forum after comparing the drawing to the actual object (or, to a referent picture we provided within the unit). Optionally, they could upload a photograph of their drawings to the discussion forum as well.

This demonstration draws on Nickerson and Adam's now-classic article in which they asked participants from the United States to demonstrate recall for a common object – a U.S. one-cent coin – by sketching the object. Typically, these drawing from memory contain glaring inaccuracies, such as reversing the direction in which the portrait of Lincoln is facing (Nickerson & Adams, 1979).

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### DRIVING AND TEXTING VIDEO

Texting while driving is not directly related to learning but given its importance as a safety issue (Strayer, Watson, & Drews, 2011), and the fact that it is a dramatic illustration of how distraction affects performance, we chose to include it. This video (RYDBELGIUM, 2012) depicts a sophisticated prank in which student drivers in Belgium are informed by a person posing as a driving examiner that as part of their driving test they will need to demonstrate proficiency in texting while driving. The ensuing video montage features students frantically insisting that this is a dangerous activity, as they run over traffic cones and otherwise flub the test.

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## CONTENT

Each set of activities and media is followed by a brief (approximately one web page) written explanation titled, "What was that about?" These did not emphasize the technical aspects of the various phenomena, but rather focused on the relationship between attention, memory, learning and other practical considerations.

The third unit, *What's Your Plan?*, was structured somewhat differently given that the objective for this unit was to introduce students to techniques of intentional behavior change and invite them to apply those concepts to distraction and related issues in their own study habits. Another objective was to follow up information about distraction with practical tools for acting on that information, such as links to resources such as researcher John Norcross' *Changeology* book and website (Norcross, 2010) (<http://www.changeologybook.com>).

The idea here was to give students strategies for making behavior changes involving technology use. For example, in the case of a student who wanted to break a habit of texting during class, relevant strategies could include planning for how to cope with the temptation to pull out the phone when class became boring or otherwise aversive, and establishing a new habit such as leaving it in a zipped backpack. Based on the intentional behavior change literature, students should also be aware that most changes like this take time, failures along the way are likely, and trying again even in the face of failure is worthwhile. As in any other form of substantive behavior change, altering technology use patterns is effortful, so expecting difficulty and setting an intention to persist after backsliding are important if the behavior change plan is to succeed.

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## ACTIVITIES AND ASSESSMENTS

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### PRE-ASSESSMENTS

At the beginning of *Attention Matters!*, students completed two pre-assessments. These served a dual purpose, first to encourage students to reflect on what they believe to be true about retention, as well as how they handle multitasking in classes, work situations, and social settings. Second, they allowed for assessment of impacts and data gathering related to the project. These two assessments, each involving twenty closed-ended questions, are described in more detail elsewhere (Miller, Doherty, Butler, & Coull, 2017). The first, which we call the Counterproductive Beliefs Survey, probed to what extent students accepted ideas such as the belief that they could learn by osmosis, or that they personally had an exceptional ability to multitask. The second, the which we call the Multitasking Behaviors Inventory, was a self-report survey probing how often participants engage in behaviors such as doing non-class related emails during classes, texting while at work, or gaming non-socially in a social setting.

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### DISCUSSIONS

Each unit culminated in a discussion forum in which students were asked to comment and reflect on the activities in the unit, with particular attention to whether they were surprised by their performance. For the third unit, students were asked to discuss actions they would take to help themselves resist distractions during classes and study sessions, or other related goals such as avoiding texting while driving. Our intent was to take advantage of the hypocrisy effect (Festinger, 1957; Stone, Aronson, Crain, Winslow, & Fried, 1994), encouraging students to commit in a public way to what they would do to better manage attention in the future.

The discussions were also intended to encourage students to share ideas with peers and offer encouragement for putting plans into practice. Lastly, we specifically invited students to consider the case in which they were being

distracted by other people (e.g., classmates who are watching videos on easily visible laptop screens), with the goal of uncovering ideas about how they might navigate such a potentially awkward social situation.

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## QUIZZES

Each unit also included a brief, ten-question multiple-choice quiz. Scores were displayed immediately after the quiz, with feedback about wrong answers.

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## CLOSING REFLECTION

At the end of *Attention Matters!*, students completed a brief open-ended self reflection about how they would apply the material going forward.

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## IMPACTS

This resource has been well-utilized at our institution. As of this writing, 2,969 participants have enrolled in *Attention Matters!* at our home institution. Of those enrolling, approximately two-thirds completed each end of unit assessment: 79% for unit 1, 76% for unit 2, and 73% for unit 3. While these numbers fall well short of 100%, they are relatively high compared to those often found for other types of open online modules such as MOOCs (massive open online courses; Pursel, Zhang, Jablokow, Choi, & Velegol, 2016). This may reflect the short time commitment and the incentives provided by instructors assigning the module for extra credit.

The *Attention Matters!* module has become a standard for the design of other self-paced modules and tutorials that are included in our institution's options for student, faculty and staff training. Modules include topics such as academic integrity, supporting first generation college students, and student as well as faculty introductions to Blackboard Learn. The format has also become the de facto standard for any online, self-paced workshops that are being designed by the institution's eLearning Center.

We do not presently know whether students completing the module engage in fewer problematic multitasking behaviors during learning activities. However, there is some evidence that beliefs relating to multitasking may be affected in the desired direction. During the 2016–2017 academic year, we randomly assigned some students to complete the Counterproductive Beliefs Survey before working through the *Attention Matters!* module, and some to complete it after. Analyses indicate that counterproductive beliefs were significantly reduced for those who completed the module after, compared to before completing the module, suggesting positive impacts on awareness and knowledge about how attention and memory work (Coull, Miller, Butler, & Doherty, 2017; Miller, Doherty, Butler, & Coull, 2017).

Comments students make within the discussion forums have also been a source of insight. Students commonly express surprise about the demonstrations, and encouragingly, sometimes spontaneously express that they find them fun or interesting. The closing discussion in which they talk about in-class distraction has been eye-opening for us as well. Students express a range of preferred approaches for managing not only their own distractions, but also the difficult situation in which other students' in-class behaviors are impeding their learning.

Many are quite self-aware regarding the temptations posed by having devices such as smartphones at their fingertips during long and challenging classes, and are committed to trying strategies such as making sure that phones are in

airplane mode, tucked out of sight in backpacks and so forth. Some endorse, in particular, the Pocket Points app ([www.pocketpoints.com](http://www.pocketpoints.com)), which we were unaware of prior to starting this project. This app allows students to earn coupon points redeemable at local businesses in return for keeping their phones off during class time. As for handling distracting behaviors from other students, preferred strategies break into two categories, the non-confrontational type involving finding a better place to sit during class, and the more direct, speaking to the professor or to the offending classmates themselves.

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## CHALLENGES

*Attention Matters!* does require ongoing monitoring, primarily to ensure that the discussions are functioning smoothly and to interject occasional responses within them, and to handle occasional maintenance issues. However, this is considerably less than what would be involved in, for example, the typical online for face-to-face course. In this sense *Attention Matters!* resembles a MOOC, with most of the labor front loaded in the construction and dissemination of the module, and relatively little intensive interaction, feedback or personalized grading thereafter. The module is designed to be self-paced and faculty who assign their students to complete it only have to ensure that the Certificate of Completion is submitted if required. Otherwise there is minimal need on their part to monitor their students' participation.

And, much like a MOOC, we the designers exert minimal control over who enrolls in the course. We could, but have opted not to, question participants extensively about what brought them to the module or set entry criteria, preferring to leave it open to anyone at our institution while minimizing the time participants spend on administrative aspects of the course that are not germane to the material. This does mean that we know relatively little about the course load, academic specialization, motivations or background of the individuals completing the module.

But for psychologists, the most vexing challenge of offering this kind of experience is perhaps a philosophical one. In *Attention Matters!*, we use a number of memorable, well known effects to try to make a point to our participants about how limited their attention is, and to encourage them to reflect on how multitasking impacts performance in a variety of everyday tasks and settings. We offer explanations for these phenomena that we believe to be generally accurate, but that may not reflect the full level of detail found within theoretical accounts favored by academic experts. For example, change blindness probably involves a complex interplay among multiple factors, including the ability to focus attention on specific locations and the relationship among objects in a display (Schank, Bergmann, Schubert, & Hagemann, 2016). Thus, although it is generally accurate to say that change blindness occurs as a function of failed attention, this is a fairly substantial simplification. Our challenge, as we saw it, was to find the balance between fidelity to the science and utility for reaching our particular goal and target audience - i.e., to build better understanding and behaviors relating to distraction, among a general population of college students.

Does our simplified presentation of these cognitive phenomena mean that students who complete *Attention Matters!* will be at a disadvantage if they later take cognitive psychology courses that feature detailed theoretical explanations? We proceed with the belief that they will not. However, we wish to draw attention to this issue as an important one for other psychologists seeking to adapt this approach to other topics, especially if they plan to create materials that are engaging for general audiences in a fast-paced, interactive format.

A final consideration is that of accessibility. Our two videos were captioned and thus usable for hearing-impaired individuals, as were all other materials, and as described earlier, the Stroop effect demonstration includes a version

that is usable for colorblind individuals. However, there are inherent limitations in accessibility to low-vision individuals for our demonstrations involving visual attention. In the instructions to students, we acknowledge this limitation and encourage students with accessibility concerns to contact us or work directly with their professors to determine an alternative. Our faculty guide (see Appendix A) also contains a section, titled Accessibility, that lists which of the materials are accessible to students with sensory limitations and which are not, so that faculty can determine appropriate alternatives.

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## CLOSING SUMMARY

The *Attention Matters!* project represents a novel approach to giving psychology away (Miller, 1969), one that we have found to have a high degree of appeal to faculty, as evidenced by the willingness of faculty to incorporate the module into their courses. Because of this, it has engaged numerous students across the curriculum. It has also allowed us to learn more about the ways in which college students view the role of technology in their own lives and how they manage distractions, both through the assessment instruments and through the qualitative comments offered in the discussion forums.

Institutions wishing to create similar resources should start by establishing a collaboration between an instructional designer or design team, and a subject matter expert. Within the frame of an online module, instructional design and subject matter experts can collaborate to identify short, compelling multimedia, video and online activities that actively engage students in the principles the module is intended to address. Short auto-graded assessments can then be coupled with reflective discussion to further engage students in questions raised by the activities.

Lastly, student audiences can be targeted by reaching out to program leaders, such as in our case the director of our institution's First Year Learning Initiative (who is the first author of this publication; <https://nau.edu/provost/vp-tlda/fyli/>). These program leaders can then promote the module among their affiliated faculty. It has been our consistent experience that when presented with a module that is easy to use, well grounded in evidence, and relevant to their own teaching concerns, faculty across disciplines are highly receptive to the idea of using it in their own courses.

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## APPENDIX A - ONLINE RESOURCES

*Unit One: What Do You Know About Attention?* (in order of presentation in the unit)

- The Colour Changing Card Trick: <https://youtu.be/v3iPrBrGSJM>
- Sports Focus Test: <https://youtu.be/vJG698U2Mvo>
  - o (We changed the name of this test to avoid spoilers)
- Mental Multitasking: <https://faculty.washington.edu/chudler/java/ready.html>
- ALTERNATIVE: Mental Multitasking: <https://faculty.washington.edu/chudler/java/ready.html>
  - o This second link is provided for participants who may be color blind

*Unit Two: What Happens When We Overload Attention?*

- The Impossible Texting and Driving Test: <http://www.youtube.com/watch?v=HbjSWDwJILs>

*Unit Three: What's Your Plan?*

Changeology: <http://www.youtube.com/watch?v=HbjSWDwJILs>

*Attention Matters! Faculty Guide:*

<http://bit.ly/2BGTNV5> or

[https://drive.google.com/open?id=1b5D\\_8mUXcSvkoeu9Bho\\_zmmNNHmCo8mV](https://drive.google.com/open?id=1b5D_8mUXcSvkoeu9Bho_zmmNNHmCo8mV)

The *Attention Matters!* faculty guide includes instructions for Northern Arizona University faculty on how to include the module in their own courses. It also provides some background and lists the unit level learning outcomes for the module.

CHAPTER  
25

# ONLINE SERVICE LEARNING IN PSYCHOLOGY: LESSONS FROM LITERATURE AND EXPERIENCE

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## INTRODUCTION

Service learning is a beneficial pedagogical tool (as reviewed by Bringle, Reeb, Brown, & Ruiz, 2016a; Bringle, Ruiz, Brown, & Reeb, 2016b; Chapdelaine, Ruiz, Warchal, & Wells, 2005; Heckert, 2010), that can be defined as, “a teaching and learning strategy that integrates meaningful community service with instruction and reflection to enrich the learning experience, teach civic responsibility, and strengthen communities” (National Service Learning Clearinghouse, 2012, para. 1). Because this chapter is written for instructors of psychology, it is important to note that service learning pedagogy is related to Goal Three (Ethical and Social Responsibility in a Diverse World) of the American Psychological Association’s (APA) Guidelines for the Undergraduate Psychology Major ([www.apa.org/ed/precollege/about/psymajor-guidelines.pdf](http://www.apa.org/ed/precollege/about/psymajor-guidelines.pdf)), as well as APA’s Ethical Principles of Psychologists and Code of Conduct (<http://www.apa.org/ethics/code/>). The importance of integrating service learning into psychology education is well-documented (Bringle et al., 2016a; Bringle et al., 2016b).

With an increase in online and hybrid education, as well as practical barriers to implementing service learning, psychology instructors might find it difficult to incorporate this valuable pedagogy. This chapter addresses how we can increase flexibility when using service learning by creating opportunities for face-to-face service learning in online courses, and by creating online service learning opportunities (a technological advancement for instructors) that can be used in traditional, online, and hybrid courses at all levels of education. Waldner, McGorry, and Widener (2012) defined “e-service-learning” as, “when the instructional component, the service component, or both are conducted online” (p. 125). A related term for this endeavor might be *virtual service learning*. For clarity, we will discuss two distinct options for delivering service learning: Face-to-face service learning in online coursework and service learning projects that occur entirely online (and can be implemented in online, hybrid, or face-to-face, traditional courses). We begin our chapter with a review of literature and conclude with resources and suggestions for psychology instructors who wish to utilize online service learning.

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## RATIONALE: SERVICE LEARNING IN PSYCHOLOGY AND THE NEED TO OVERCOME BARRIERS

Staying abreast of how technology has changed service learning incorporation is important for psychology instructors due to the relevance of service learning pedagogy in the field of psychology. Bringle et al. (2016a) argued for “the need in education in psychology to be concerned with the public good and to be sensitive to pressing social issues such as justice, peace, the alleviation of suffering, and the promotion of human flourishing to complement the prestige-oriented culture in academic psychology that is heavily weighted toward basic research” (p. 23). Service

learning is related to Goal Three (Ethical and Social Responsibility in a Diverse World) of the APA's Guidelines for the Undergraduate Psychology Major (<http://www.apa.org/ed/precollege/about/psymajor-guidelines.pdf>). Service learning is also consistent with aspirational statements in the preamble of APA's Ethical Principles of Psychologists and Code of Conduct (<http://www.apa.org/ethics/code/>), in Principle B (Fidelity and Responsibility) and Principle D (Justice) to make sure that psychologists contribute time, even without personal benefit, and ensure that all individuals have access to and can benefit from the contributions of our field. An issue that emerges, however, is that while most would agree upon the importance of service learning, "not all educators, including instructors of psychology courses, are interested in civic learning for their students, neither in each course in the curriculum nor as an area of work for themselves and their teaching, research, or professional service" (Bringle et al., 2016, p. 26).

Barriers to service learning have been well-addressed in the literature, in relation to both psychology and other disciplines. As previously reviewed by Phillips, Marron, Baltzer, Kichline, Filoon, and Whitley (2017), barriers can include making time to integrate service learning, ethical dilemmas and risks associated with projects, finding projects that are appropriate for instructors' student population (such as the working adult) or teaching modality (such as online or hybrid courses), and instructors needing professional development (i.e., limited knowledge about service learning). Technology can help to alleviate the barriers of limited time, finding projects that are appropriate for diverse student populations (like working adults who might have scheduling difficulties when projects occur outside of class time), and teaching modalities (by taking service learning projects online for students in online and hybrid courses).

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#### FACE-TO-FACE SERVICE LEARNING IN ONLINE COURSES

Although the bulk of this chapter will focus on online service learning opportunities (online projects that allow students to assist a community partner), we will first discuss how face-to-face service learning opportunities can still be available to students in online courses by reviewing articles by Guthrie and McCracken (2010) and Bossaller (2016).

In their case study of two undergraduate courses offered at the University of Illinois at Springfield, Guthrie and McCracken (2010) conducted interviews with students, reviewed course documents, examined course technology, and observed students engaged in two service learning courses. In both of the examined courses, students were required to locate a non-profit or other community-based organization to which they would provide 60 hours of service. The online courses were structured such that course content (which included public policy, leaders and activists, social change, and a history of service) served to contextualize the service learning experiences, and course assignments were designed to allow reflection on those experiences (e.g., journals and a culminating reflective project). In this way, instructors were able to make the learning process both concrete and meaningful; as described by Guthrie and McCracken (2010), communities became "laboratories." The tools available in the online environment facilitated live chats, asynchronous discussion board conversations (i.e., online conversations that can occur whenever students are available to read and post), and collaborative projects. Because of the online delivery method, the University of Illinois at Springfield courses included students from diverse communities across the United States and around the world. This diversity in student enrollments contributed to the sharing of unique perspectives and rich discussions among course participants. Another key finding was that students reported being engaged in community service after they had completed their online service learning course.

Bossaller (2016) explored a graduate-level online service learning course in a library and information science program at the University of Missouri in a qualitative study. The goal of the course was to develop students'

awareness of the needs of the community outside of the library, and students were responsible for implementing and working on projects that connected their local libraries to other organizations. Requirements for the project were flexible; for example, the type of service organization was not specified, and students' purpose in their placements was not clearly defined.

Bossaller (2016) interviewed eight students who completed the online service learning course, five of whom were considered nontraditional students and three of whom were traditional students, in two group-interview settings. Two benefits of service learning that emerged from the interviews included students' increased empathy for marginalized groups and a new awareness of the importance of listening to the needs of the community.

Several challenges related to service learning were reported as well, though the three traditional students did not report any major challenges with implementing or completing their service learning (Bossaller, 2016). Challenges related to service learning included finding a placement, explaining the purpose of service learning to volunteer coordinators (i.e., meaningful work that leverages students' expertise and developing knowledge, as opposed to menial tasks), and scheduling the service learning to fit with students' other commitments. To overcome the challenge of finding a placement, Bossaller (2016) suggested that instructors across institutions develop a network of service organizations that can be used to facilitate students' service learning placements.

These two studies by Guthrie and McCracken (2010) and Bossaller (2016) indicate that there are options for face-to-face service learning even when instructing an online class. We now turn our focus to how instructors can find projects that serve a community partner and can be completed entirely online.

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## ONLINE SERVICE LEARNING OPPORTUNITIES

While the previous two studies examined service learning projects that took place in face-to-face settings, other courses incorporate online service learning that takes place entirely in a virtual setting. We are not making the argument that online service learning projects have more value than face-to-face opportunities. However, we do believe that service learning can be incorporated into online courses, and we believe that designing online service learning projects may help to overcome the barriers that time and scheduling pose in all course formats (online, hybrid, and traditional). Furthermore, online opportunities may permit for this important pedagogy to be implemented in a variety of psychology courses, including those that are taken online and those that are taught to groups that tend to have scheduling limitations (such as working adult students; see Phillips, 2013).

Bringle et al. (2016a and 2016b) discussed four types of service learning. The first is *direct service learning*, in which students work face-to-face with service recipients (e.g., individuals experiencing homelessness, students at a local school, older adults in a gerontology course, etc.). Although this type of service learning could not occur online, the other three types of service learning projects could occur in an online implementation. The remaining three types of service learning include *indirect service learning* ("working behind the scenes to improve, expand, or coordinate resources for a community agency or neighborhood association," Bringle et al., 2016b, p. 301), *research service learning* (for which students could conduct or contribute to an online research project), and *advocacy service learning* (such as creating online presentations to raise awareness of a concern, contacting local politicians to advocate for specific groups, etc.).

An example of indirect service learning is provided by Waldner et al. (2012), who used the example that "students in an online grant-writing class might help write grant proposals for a nonprofit community partner" (p. 125) to

illustrate how students in both traditional and online courses could complete a service learning project that requires only online work.

Waldner et al. (2012) noted that complications with online service learning projects may involve difficulties with the coordination of community partners related to technology, such as synchronous and asynchronous tools. Regarding community partners, it is imperative that they would be both amenable to having and using the technology needed or be willing to learn any technology related to the project when applicable (Waldner et al., 2012). Location could be a barrier as well, particularly if the community partner is in a different region or country, which could affect their availability or impact timelines and deadlines. To overcome difficulties, a clear and thoughtful course design is important (Waldner et al., 2012). Course design can include aligning the online activities to learning objectives, making sure there is ample time to accomplish the service learning project, and monitoring students' experiences.

Unfortunately, there is limited literature on the use of online service learning opportunities. Becnel and Moeller (2017) described a project in which graduate students in an online library science program assisted their local libraries to refine book purchase lists. Although implementing this project came with challenges (such as needing to have very clear assignments and guidelines since instructors could not provide direct supervision in this online course), the authors concluded the project was very beneficial, and an analysis of themes in students' responses (completed by researchers who reviewed journals and reflection papers of 22 students) indicated that the students found the project and course discussions to be valuable. We believe the project described by Becnel and Moeller (2017) could occur as face-to-face service learning in online coursework (since students assisted their local libraries) or as a service learning project that occurs entirely online (depending on the type of assistance provided to the library).

In addition to the Becnel and Moeller (2017) example, Heckert (2010) provided two examples of service learning projects that might alleviate the barrier of instructors and students having limited time. Although these projects were not discussed as being online, these examples could be implemented online.

As a first example, Heckert's (2010) suggestion is to seek project partners within one's own campus community, such as a campus office or organization. Heckert (2010) refers to these partners as "internal clients" (p. 33). This method reduces faculty time spent coordinating with a community partner and avoids potential transportation difficulties associated with off-campus partners, but does not provide outside connections that could be beneficial to students, as many other service learning opportunities could provide. Psychology instructors could implement Heckert's (2010) example by completing a project for their own campus online, for example, surveying undergraduates' perspectives on the mental health services provided in the college counseling center.

The second example of reducing the barrier of time that Heckert (2010) identified is "end product collaboration" (p. 33), in which students work together to produce a document or product that will assist an identified partner either in the campus community or in the external community. Examples of products Heckert (2010) described include students working together to design a workshop for a local agency or develop curriculum for a local school; we believe both of these projects could be completed via virtual collaboration.

A case example of an online service learning project is described by Phillips (2014) who maintains an ongoing project for psychology students to find resources for individuals who reenter society following a prison or jail sentence. This project allows students to develop resource guides for this population that are then shared on a public website.

Developing a resource guide (whether for a website or for a community agency to distribute) is an additional example of a service learning project that could occur entirely online.

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## IMPLEMENTING AND ASSESSING ONLINE SERVICE LEARNING PROJECTS

Helms, Rutti, Hervani, LaBonte, and Sarkarat (2015) provided recommendations on how to implement and assess service learning projects in online courses. Recommendations for implementation include allocating time to thoroughly describe expectations for the project, including milestones and due dates, and identifying community partners for the projects. This identification can occur either through the instructor making the connections with community partners who could benefit from student assistance, or through the students independently making connections with organizations in their own communities.

Helms et al. (2015) also suggested that the instructor utilize groups for the service learning projects, rather than having students work individually. Groups can be assigned by the instructor, giving consideration to factors such as student interests, demographics, and location. Groups should then develop their project outline and action plan. The former should include a problem statement, the goal of the project, and how the project connects to course content, while the latter should include the specific steps that will be undertaken to complete the project, the responsibilities of each group member, and any data that will be collected as a part of the project. In addition, the action plan portion of the project should involve students in learning more about the problem they are trying to solve via online research and communication with related organizations.

The authors' recommendations for project evaluation include having student groups submit both a written project and an oral presentation, and having instructors create midterm and final assessments that are administered online (Helms et al., 2015). A 5-point Likert scale is the suggested format for the rubrics used to assess student submissions. The instructor should also involve other entities in the evaluation process, such as community members, other faculty members or students, or the community partners. The involvement of multiple sources in the evaluation process can allow for richer feedback and a more authentic project assessment. Finally, because students are working in groups, an online survey that allows students to provide feedback on their other group members should be included.

Because students in online courses are likely to be geographically dispersed, the authors make recommendations for staying connected via course technology (Helms et al., 2015). For example, the instructor may post a video to the course of him/herself explaining the project. Online discussion boards should be used to reflect on the projects and to receive feedback from the instructor and from peers. Webinar technology, such as Skype, can be used for group meetings, as could conference calls. Because students may not have easy access to the university librarian, the librarian could be enrolled in the course in order to provide research assistance. Web links related to research and course content could be posted in the online course, as well.

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## SUGGESTIONS FOR PSYCHOLOGY INSTRUCTORS

In review, Helms et al. (2015) provided general tips for implementing and assessing online service learning. As we conclude this chapter, we intend to provide resources and tips that will help psychology instructors, in addition to those tips suggested by Helms et al. (2015). As past literature demonstrates, students in online courses can participate in face-to-face service learning (Bossaller, 2016; Guthrie & McCracken, 2010). Additionally, an online service project (i.e., a project in which the students' service occurs entirely online) can be implemented in online

courses, hybrid courses, and even in traditional courses when the flexibility of an online project could make service learning more accessible to students. We first share resources to assist psychology instructors in this endeavor.

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#### RESOURCES FOR SERVICE LEARNING IN GENERAL.

With respect to service learning in general, professional journals for service learning include: *Journal for Civic Commitment*, *Journal for Civic Engagement*, *Journal of Community Engagement and Higher Education*, *Journal of Community Engagement and Scholarship*, *Journal of Higher Education Outreach and Engagement*, *Michigan Journal of Community Service Learning*, and *Partnerships: A Journal of Service-Learning and Civic Engagement*.

Another significant service learning resource is the Campus Compact coalition ([www.compact.org](http://www.compact.org)). Campus Compact is comprised of almost 1,100 colleges and universities across the country, with the purpose of supporting its member institutions with improving their local communities and educating their students to be socially responsible citizens. One of the priorities of Campus Compact is to “establish meaningful, reciprocal community partnerships” (Campus Compact, 2015, Strategic Plan, para. 5); to support this priority, Campus Compact offers a number of resources and services for its members, including providing professional development to empower instructors to integrate service into their courses and research, connecting institutions of higher education with important issues in their local communities, and maintaining an online database of resources for community-based teaching.

Resources available on the Campus Compact website include books and publications for purchase, blogs, news articles, links to other web resources, videos and presentations (including slides addressing topics such as engaged scholarship and community-based participatory research), and a searchable database of syllabi for service-oriented courses offered by other colleges and universities. Additional resources specifically related to service learning include a guide for incorporating structured reflection into service learning courses and a service learning toolkit for administrators that includes information on planning for and measuring community engagement.

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#### RESOURCES SPECIFIC TO PSYCHOLOGY.

Campus Compact contains both general information and discipline-specific information for psychology. Another excellent resource for service learning in psychology is the book *Service Learning in Psychology: Enhancing Undergraduate Education for the Public Good* (Bringle et al., 2016a). The Society for Teaching of Psychology also maintains a listserv and public Facebook discussion group where instructors of psychology could explore online service learning opportunities and seek feedback and collaboration from other instructors at various institutions. Finally, examples of service learning projects for various psychology courses are discussed by Bringle et al. (2016a and 2016b) and Schmidt and Zaremba (2015).

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#### RESOURCES FOR ONLINE SERVICE LEARNING PROJECTS.

There are also some excellent websites that provide ideas, examples of online service learning projects, and resources. These websites are organized by several institutions of higher learning, including Boise State University (<https://servicelearning.boisestate.edu/about/sl-online-education/>) and University of Central Arkansas (<http://uca.edu/servicelearning/virtual-service-opportunities/>), as well as the Center for Digital Civic Engagement, developed by Minnesota Campus Compact (<https://cdce.wordpress.com/service-learning-in-online-courses/>).



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## CONCLUSIONS: LESSONS LEARNED

In closing, service learning is a valuable pedagogical tool that benefits students (as reviewed by Bringle, Reeb, Brown, & Ruiz, 2016a; Bringle, Ruiz, Brown, & Reeb, 2016b; Chapdelaine, Ruiz, Warchal, & Wells, 2005; Heckert, 2010) and is especially important in the teaching of psychology (Bringle et al., 2016a; Bringle et al., 2016b). Learning how to incorporate service learning in online courses, as well as organizing online service learning projects for all types of courses may help psychology instructors to utilize this pedagogy in a wide variety of course settings and with a diverse group of students.

Instructors who wish to develop online service learning projects and/or implement face-to-face projects in online courses can benefit from utilizing the resources we provided in the previous section. Instructors will also want to consider any possible technological challenges (Helms et al., 2015; Waldner et al., 2012), any challenges related to overseeing such projects, any possible ethical considerations (for more, see Chapdelaine et al., 2005), and how they will assess their project prior to introducing service learning projects to students (for more, see Helms et al., 2015, and Schmidt & Zaremba, 2015). Bossaller (2016) pointed out that some of these projects might allow for flexibility, which could cause frustration if project descriptions are vague, but could also be beneficial for students in that flexibility allows students to choose projects that are tailored to their interests and career goals (which may be especially important for some groups of students, such as adult learners; see Reed, Rosing, Rosenberg, & Statham, 2015).

We suggest that when implementing service learning projects, the assignment guidelines and grading rubrics be as specific as possible, and that instructors be available for support and to answer questions. When implementing service learning in psychology courses specifically, the objectives of the service learning project should be explicitly linked to the course objectives, and perhaps to overarching goals in the field of psychology (e.g., Goal Three in Guidelines for the Undergraduate Psychology Major; [www.apa.org/ed/precollege/about/psymajor-guidelines.pdf](http://www.apa.org/ed/precollege/about/psymajor-guidelines.pdf)). A good reference for writing learning objectives for service learning that are linked to APA goals is provided by Bringle et al. (2016b).

Service learning projects should also include some type of reflection on the experience, which instructors can incorporate into online group discussions and individual writing. For example, Schmidt and Zaremba (2015) discuss how an ongoing written exploration (such as a journal, which could be completed online) allows students and instructors to continuously explore and assess the service learning experience, as well as to process emotions and understand more about the group of individuals they are assisting (which might be especially important in online service learning projects since services are not face-to-face with a population in need).

Finally, instructors should consider assessment in advance, including ways to assess whether or not course objectives were met, and ways to assess student satisfaction with the service learning experience (for more suggestions, see Helms et al., 2015, and Schmidt & Zaremba, 2015). For example, we have found it beneficial to utilize an online student satisfaction survey (in addition to the standard course evaluation) where students can provide feedback specific to the service learning component of the course.

Service learning can be incorporated into online courses, and designing online service learning projects for all course types can be a beneficial endeavor for students, instructors, and communities. We also believe that the resources and options discussed in this chapter can benefit instructors of all levels of education in psychology, from high school to graduate school. It is important to note that we are not arguing that online projects are more beneficial than face-to-face projects in which individuals have the opportunity to directly assist people in need; however, online projects

can still offer excellent opportunities for students that also assist agencies and populations in need. Developing online service learning opportunities allows this important pedagogy to be implemented in a variety of psychology courses to benefit our diverse groups of students.

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# ALWAYS IN STYLE: USING TECHNOLOGY TOOLS TO HELP STUDENTS MASTER APA STYLE

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## INTRODUCTION

The perfect reference page seems to be elusive and always just out of reach. Even in upper-division psychology courses, students struggle with demonstrating competency in APA Style. The Publication Manual of the American Psychological Association itself states that its inception aimed to provide “sound and rigorous standards for scientific communication” and that codification was adapted for scholarly endeavors in fields within social and behavioral sciences (American Psychological Association, 2010, xiii). As students enter the discipline it is a marker of their progress and immersion in the field when they can accurately employ correct APA Style in their work. Yet, again and again, college instructors report that student skills in this area are inadequate and a great source of frustration (Mandernach, Zafonte, & Taylor, 2016).

Exacerbating the long-reported faculty frustration with student documentation skills, the web content revolution has made what was always a tedious and detailed process one that is increasingly murky and confusing. Back in 2001, Davis and Cohen noted that the increase in web sources was resulting in even less accurate citations. If that was the case then, surely the explosion of websites and online content in the ensuing years has only made this problem worse. In the sixth edition of the Publication Manual, the editors note that electronic sources have gone from “the exception to the rule,” rendering prior models for citing out of date (American Psychological Association, 2010, p. 187). Yet the expectation is that students will be proficient at correctly documenting their sources and that they will be graded accordingly.

Though grading for correctness in APA Style may be the driving factor for both students and faculty, at heart correct APA Style can help students avoid plagiarism. As Sheehan (2014) argues, instructors are better off being proactive and educating students about plagiarism at the outset of an assignment, rather than addressing the issue with awkward conversations and ethical conduct committees after the fact. Between the availability of accessing other students’ papers for free or for a fee and the facility with which content can be cut and pasted into papers, the web has made plagiarism easier, more tempting, and nearly omnipresent. To increase the stakes, students report being confused about what exactly constitutes plagiarism (Childers & Bruton, 2016). In this academic culture, providing students with the reasons and the means to cite correctly is more important than ever.

While technology and the omnipresence of electronic sources have made citing and referencing in correct APA Style that much more challenging, it is the premise of this chapter that technology tools can also help provide a solution. As Kirkwood and Price (2013) caution, it is important that the teacher is still the “agent” of learning, actively using technology to create or enhance meaningful educational activities, as opposed to technology being the agent or sole means of instruction (p. 333). Technology itself will not solve the problem; however, different online resources can help to engage students and allow them to work with APA Style in different modalities. A few caveats: One tool in

and of itself may not be the complete solution but may instead be one tool among many. Arming students with various resources that they can easily access, combined with technology-aided feedback and engaging instruction can be a magical combination. Slezak and Faas (2017) identify this integrated and multi-pronged approach to learning as “inter-teaching,” while others might simply call it good pedagogy.

Consider also the modality. While online classes might have little choice but to provide an electronic review of APA Style, instructors need not be limited to a static text or even a video. Although face-to-face instruction appears to be more effective than simply assigning online tutorials (Zafonte & Parks-Stamm, 2016), it is clear that the web offers endless opportunities for innovation beyond, or in conjunction with, APA Style tutorials.

The remainder of this chapter highlights various online resources that help students to gain mastery of APA Style. Some are intuitive and obvious though no less helpful (i.e., the blog of the APA) while others, like Pinterest, may be a bit outside the conventional box. The goal is to provide a bevy of resources for students that will be readily available in the electronic spaces in which they already live and which bring some level of engagement and interaction to what is often a dreary and desultory topic.

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#### START WITH THE SOURCE

While the bound copy of the sixth edition of the Publication Manual of the American Psychological Association likely sits dog-eared on the professor’s shelf, it is likely that students, particularly those who are not psychology majors, are going to instead reach for the ubiquitous and seemingly helpful world of online resources when they need help with APA Style. As such, instructors can direct them to the online version of the trusty manual: [www.blog.apastyle.org](http://www.blog.apastyle.org). It might be worth the time to preface an introduction to this great resource by clarifying “blog” for students, reminding them while a blog is not typically considered a reliable source in college papers, this is an exception. This is the actual blog of the APA Style Guide and so it is an authoritative source. It is dubbed as the “official companion” to the Manual and “run by a group of experts” in APA Style (American Psychological Association, 2009). It is here that students can find either direct or round about answers to some very specific and one-off APA Style questions, such as citing a TED Talk or a tweet. This resource is particularly useful for more obscure citing needs or electronic resources that are not included in the official manual. The site provides a good overview of APA Style, in addition to their weekly posts focused on various citation quandaries. They are also active on social media but the indispensable part of the website, and why it should be heartily recommended to students, is the search function that it includes. Where one of the challenges of the hard copy of the Publication Manual is finding the information you need when you need it (thank heavens for an index!) the search box function at the APA Style blog does a very good job of getting students the information they need with a minimal amount of frustration.

One of the other useful aspects to share with students is the blog’s advice on citing web sources. While the Publication Manual does a fusty yet serviceable job of providing this info, the blog has a great post and visual that helps students identify key aspects of how to cite a website when none of the examples are matching up. This, of course, brings up the idea that citations are only as good as the information provided by the user and so in clearly explaining and identifying those key aspects of a website (website versus web page, for example) it is a handy tool for students to refer to when their citation need is murky, as increasingly happens in our online world.

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## ONLINE CITATION GENERATORS

Though Kessler and Van Ullen (2005) reported citation generators to be mostly accurate and advantageous to undergraduates who need to cite correctly, classroom experience does not always bear that out. In this author's quick exploration of three popular, free online APA Style citation generators, using the same recent journal article, the generators located the article that I was citing so I did not have to input any information. Of the three, BibMe, Citation Machine (those two are essentially the same and both are Chegg products) and Citethisforme all came back with errors. All of them lost the italics in being cut and pasted into Word and erroneously capitalized each word in the article title. In addition to that, Citethisforme did not include the doi number, left off the author's middle initial and included pp. before the page numbers. Similar types of errors are found when students pull citations from electronic library databases and it makes citation generators live up to the label of dubious that instructors and researchers have given them (Stevens, 2016).

In cases where the information cannot be directly called up by the generator and instead must be input by the student, say in the case of an organization's web page, the citations are only as good as the information the user inputs. So if students cannot differentiate a volume number from an issue or even a newspaper article from a journal article, the output of the generators will likely be faulty as well, and citations will be inaccurate. Stevens (2016) found that the most frequent student error in citations was the omission of required, often key, information and, as a result, citation generators would be useless in this regard. There are so many nuances to be explained to undergraduates for them to correctly input information – for example, when citing a newspaper it is not sufficient to just include the year since there were 365 New York Times published in that time and more specificity is needed – that citation generators are really a last resort and some form of APA Style instruction is necessary to reap any benefit.

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## MICROSOFT WORD

It is possible that the most used tool is the one that we overlook as playing a large and important role in teaching students APA Style. While certainly instructors spend copious amounts of times in Word whether writing or grading, there are many tools within the program that can be harnessed to help students with their APA Style accuracy.

Prewritten comments for the most common APA Style errors can be input into Word using the AutoText feature. While general comments such as "This reference page does not meet APA style requirements" may be a good start, instructors can go even further to highlight some of the more nuanced issues: "Be sure your references are aligned left and then insert a hanging indent. For instructions on inserting hanging indent please visit <https://support.office.com/en-us/article/Create-a-hanging-indent-7bdfb86a-c714-41a8-ac7a-3782a91ccad5> for step-by-step instructions." By typing in that sentence and link once and then setting it up as AutoText and assigning it a simple code created for that particular comment, perhaps "H11," the instructor can insert that whole block of text in a comment box for students to correct on future papers. Harnessing the power of this feature in Word not only frees up precious grading time for instructors, but allows students to learn where they are erring and how to correct it in the future. For more information on using the Autotext feature visit the Microsoft support page: <https://support.office.com/en-us/article/Automatically-insert-text-0bc40cab-f49c-4e06-bcb2-cd43c1674d1b>.

It is often assumed that the current generation of college students is extraordinarily computer savvy because they grew up with smart phones and laptops. While that is sometimes the case (A+ at navigating Snapchat!), instructors are often surprised at how little proficiency students have with Microsoft Word. Specific instructions and comments with imbedded resources would be a great help to getting them up to speed on mastering all the little indents, tabs

and headers that the exacting APA Style demands of them. In addition to using autotext in grading, instructors can create screenshots of the features that help students set up their papers correctly prior to submission. For example, compiling and posting a document that includes screenshots and instructions for accessing the “Special” dropdown box in the Paragraph tab that allows users to create a hanging indent would be of great help. While the initial set up of such a document might be time-consuming up front, it could be used for several semesters and will save APA Style grading frustration in the long run.

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### CREATING A TEMPLATE IN WORD

Because setting up headers correctly can be a confusing and frustrating process even to those who have done it before (I have a four page screenshot pdf that I follow when I create a document in APA Style from scratch) instructors might consider that because the focus is to get APA Style right and not have a course in the nuances of Microsoft Word, providing students with a template into which they can directly type their information is a great tool, particularly for underclass students with no prior exposure to setting up a paper in APA Style. Explaining the template prior to first use (“Yes, I know it sounds strange but you keep the words ‘running head’ at the top”) can also be a help to students as they acclimate to the formatting requirements. Again, creating the template requires an investment on the part of the instructor but will pay off when every student submission has a correctly capitalized header title.

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### SCREEN RECORDING SOFTWARE

Screen recording software (for example, Screencast-o-matic, Snag-it, Loom, or Jing) can serve instructors well both to work pre-emptively and post-assessment. One initial use might be to record setting up a paper in APA Style or walking students through the components of a title page. I often have students download a template and yet some still get it wrong because they do not realize that the words “running head” stay at the top or that the capitalization is intentional. Pointing these things out on a video can be helpful to students who are unfamiliar with what belongs in a paper in APA Style. Madson (2017) argues that the use of screencasts in conjunction with written comments might provide the best of both worlds for many students. This combination of visual and auditory feedback, combined with the narration of the instructor’s voice highlighting APA Style errors and correcting them, would likely serve as a really personal and effective means of having students tune into their APA Style errors and fix them with intention. This technique would be particularly useful in online instruction where a recording of the instructor’s voice can help students to feel more connected and engaged with the class.

There are several different resources available for use, some free, others with a yearly subscription fee, that can capture and record your screen and a voice over. Most companies offer free trials so an instructor can actually get some hands-on experience with the tool prior to committing, although yearly subscriptions are generally quite reasonably priced. Some of the free software limits recording time to five minutes which may be a consideration depending on how extensive the feedback an instructor provides. Additionally, some require software installation and others are web-based. Some require students to download and open a file while others simply produce a link that students can click on to view their feedback online. Budget, student needs and hardware are considerations that instructors must wade through prior to using screen-recording software but the benefits for students are manifold.

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## ONLINE TUTORIALS

Many universities have created tutorials in APA Style to help their students, with various grades of interactivity and production values. Often these are for internal use or housed within a LMS or another system the student must log into. Hood (2014) describes the creation of a self-paced online APA Style course for her university that faculty members can place within their course and modify as needed in preparing their students. There are also some open-use, outward facing ones that can be helpful. I have found the Harvard School of Business' online tutorial APA Exposed (Mages, 2009) particularly helpful in providing both a great overview, smaller modules for students to focus on their needs and interactive quizzes at the end, allowing students to test what they have learned. There is also evidence that these online tutorials are most effective when used in conjunction with additional instruction (Zafonte & Parks-Stamm, 2016).

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## REFERENCE ORGANIZERS

For graduate students in psychology, along with some ambitious undergraduates, citation and reference organization software offers advantages. Common software such as Endnote, Mendeley, or Refworks can be great resources to store and organize articles and they can also help students easily transfer correctly formatted citations from the software into their word processing program. Like other citation generators though, the accuracy of the citations is only as good as the information input. For newer articles the fields populate with greater accuracy than older articles but there is also a pretty large amount of errors in these uploads. Again, the citations have the capacity to be accurately formatted but only after they have been checked and input with some care. These resources come with the obvious added bonus of their actual intended use which is to provide a housing mechanism for research articles; upper division students who may be working on a thesis or have an interest in a particular subject area would benefit from not just the citation function but the organization and ease of access to their research as well.

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## SOCIAL MEDIA TOOLS

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### PINTEREST

Pinterest calls itself the “world’s catalog of ideas” that helps “people discover the things they love” (Press, n.d.). For those unfamiliar with the concept, it essentially works like a modern day bulletin board or vision board where users create different themed boards and then digitally “pin” ideas, images, or articles to their board. It is the high tech equivalent of ripping out a magazine article to save but in this case it never goes missing when it is most needed because it is safe and organized online. Boards can be private or public to be shared with others. Saying “I’m going to spend 5 minutes on Pinterest” is an oxymoronic statement as it is a time-sucking rabbit hole of wonder and joy. Though this endorsement might not seem to make it an intuitive classroom technology tool and despite the fact that sometimes male students can be off-put by it and all users may need to create an account to view any content, Pinterest can be used for classroom purposes with great success because it allows instructors to take something students think is kind of fun and that they are already using and adding an educational element to it (Terry, Valenti, & Farmer, 2017)

Because this tool is so popular and attractive, it is a natural place to cultivate a space for all things APA that can then be shared with students. In a first-year composition class, rather than hand out a list of links to students, posting in the LMS a URL to a Pinterest page pinned with strong reliable APA Style sources (i.e., APA style blog page, your school’s library home page, OWL at Purdue) can make following up with those sources more intuitive and fun for students. It puts all those sources online in an engaging way so that the good information is literally at their



fingertips. Alternatively, you can flip the exercise and make students collect and pin their own resources that they have sleuthed out to help them with their papers. Ultimately, teachers may find Pinterest to be a great place to organize their ideas and resources for their own work. Here is a link the board created for my freshman composition class: <https://www.pinterest.com/mariazafonte/apa-style/>

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## PADLET

Padlet is online software that allows users to easily “create and collaborate” (What is Padlet, n.d.) on pages that they create and then invite users to view or edit. While Pinterest allows users to find and save content they come across online, Padlet is focused instead on providing a space for the creation of original content, although images and articles can be pasted into a Padlet as well. Padlet can be used in both synchronous and asynchronous environments. One possible way it can be harnessed is to create an incorrect reference page which students must go into to collaboratively edit and note the changes they made. By giving users the URL and full edit privileges, students can go in and change the references and correct them. In addition to having students work on this page individually or in groups, this Padlet page can simultaneously be projected on a screen and the whole class and instructor can view the edits in real time. Personal experience with this tool has demonstrated that this works best in relatively small classrooms, and maximum effectiveness tops out at 35-40 students. Although it certainly can accommodate greater numbers, too many users can provide a situation where students can hide behind inappropriate or distracting anonymous posts in a classroom, which could ultimately take away from the learning experience. In total this small drawback is vastly outweighed by the flexibility and engagement provided by this online collaborative space. An example of a Padlet reference page in need of student correction can be found at the following URL: [https://padlet.com/maria\\_zafonte/konzbxvj1w22](https://padlet.com/maria_zafonte/konzbxvj1w22)

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## CONCLUSION

This chapter provided a sampling of the ever-expanding technology tools that can be used to help students understand and master APA Style. These tools are just that: tools. There is no panacea for correcting all student citation errors. However, judicious use of technology tools, in combination with each other and grading and feedback can allow students engaging and dynamic ways to gain proficiency at a rote and confusing procedural necessity.

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# HOW SOCIAL MEDIA IS USED TO ENGAGE STUDENTS IN LEARNING

CHAPTER  
27

# CLASS, PLEASE TAKE OUT YOUR SMARTPHONE: USING PERSONAL RESPONSE SYSTEMS TO INCREASE STUDENT ENGAGEMENT AND PERFORMANCE

LAUREN STUTTS DAVIDSON COLLEGE

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## INTRODUCTION

Due to the advancement of technology, there are a number of innovative ways that it can be used in the classroom. Some individuals may argue that technology should not be integrated in the classroom due to its potential distraction; however, because technology is such an integral part of students' lives today, it is worthwhile to capitalize on it rather than avoid it. This chapter will specifically address the use of personal response systems (i.e., clickers) in the classroom. The effectiveness of personal response systems and why they work will be discussed. Subsequently, I will describe how I use a personal response system, Socrative, in the classroom.

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## WHAT ARE PERSONAL RESPONSES SYSTEMS?

Personal responses systems or "clickers" have commonly been used in the past decade as a method of interacting electronically with instructors during class. These devices are typically small and simple in instruction and have keys for multiple choice answers. Mobile phones can now be easily used as personal response systems instead of using stand-alone clickers. The instructor typically processes the responses from the clickers/mobile phones through an individual computer using either special software or a specific website to manage the data.

Dallaire (2011) found that instructors most commonly use clickers in class to collect attendance, foster improved discussion, administer quizzes, and assess student mastery of the material. In addition, clickers can help students work through challenging questions. For example, students can provide their initial response to a challenging question, then discuss in a small group which answer is correct and why and then respond again via the clicker. Another advantage of using personal response systems is the ability for students to respond anonymously, which can provide a less pressured interaction with the instructor.

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## DO PERSONAL RESPONSE SYSTEMS WORK?

The effectiveness of clickers has been studied experimentally. For example, Morling, McAuliffe, Cohen, and DiLorenzo (2008) conducted a randomized, controlled experiment in which they assigned two introductory psychology classes to using clickers and two classes to not using clickers. They found that the classes that used

clickers had slightly higher grades than classes that did not use clickers. However, they did not find differences in engagement in class due to clickers. That said, they explained that one of the limitations was that the clickers were used minimally in class (i.e., at the beginning of class five questions were posed via clickers), so perhaps the engagement outcome would be different if clickers had been used throughout the class. In another experimental study, Stowell and Nelson (2007) assigned psychology classes to one of three conditions: a clicker class, a response card polling class (i.e., students raised paper cards with their answers), and a hand-raising class (i.e., students simply raised their hands for polling purposes). They found that individuals in the clicker group participated the most, reported greater positive emotion, and were more honest in responses to in-class questions than the other two groups.

In addition, Shapiro and Gordon (2012) found that in-class clicker questions improved performance on an exam by 10 to 13% in a psychology class. Dallaire (2011) indicated that performance benefit of clickers depends on amount of clicker use, however. Shapiro and Gordon (2012) found that having too high or too low of clicker use was associated with lower grades and having moderate use (about four reported uses in class) was associated with higher grades. Furthermore, Dallaire (2011) concluded that clickers were helpful for some students but not others. For example, seniors reported less benefits of using clickers than non-seniors, and students who were biology/neuroscience majors perceived less benefits than students who were psychology majors.

There are a number of disadvantages to using clickers. For example, Dallaire (2011) found three main problems to using clickers in the classroom: 1) students would sometimes forget to bring the clicker to class, 2) the clicker would malfunction at times, and 3) the students did not like having to pay for a clicker. Therefore, using students' individual mobile devices such as smartphones and iPads instead of clickers are more recent ways to incorporate response systems in the classroom without the potential drawbacks Dallaire (2011) identified. This shift makes sense due to the increase in prevalence and accessibility of smart devices. In fact, polls indicate that as of 2016, 92% of 18- to 29-year-olds in the United States own a smartphone (Smith, 2017). Phones have advantages over the use of personal clickers such that instructors do not have to pass them out, students know how to use them, and they typically do not cost the students' additional money.

Using mobile devices in the classroom has also been examined. For example, Voelkel and Bennett (2014) used the Poll Everywhere system (<http://www.poll.everywhere.com>) in introductory biology classes. This entailed having the instructor set up poll questions in PowerPoint and then students would use their mobile phones to text their responses. The class responses would then appear in real time in the PowerPoint. The instructors reported that it was easier and faster to use this system compared to using traditional clickers. In addition, the students reported that the polls made the class content more engaging and that they learned more. However, the students who did not participate said that it was too expensive (e.g., some students had a phone plan that charged them for individual text messages), they preferred to just think about the question, or did not have their phone in class. The researchers compared student performance on exams in these classes to the performance of students in these classes in the previous two years and found that the students using the poll software had significantly higher exam grades than the previous years (Voelkel & Bennett, 2014).

While the effectiveness of personal response systems has been demonstrated in single studies, Hunsu, Adeosope, and Bayly (2016) conducted a meta-analysis on the use of personal response systems in the classroom to determine overall effectiveness across multiple studies. They found that using personal response systems had a small, positive effect on cognitive learning outcomes (e.g., grades, recall) in the classroom and a small to medium effect on non-cognitive learning outcomes (e.g., engagement, self-efficacy).

Research has demonstrated that clickers and mobile phones are effective, but which is more effective? Stowell (2015) examined the difference in using clickers versus using mobile phones in two psychology classes. He let the students choose which version to use for the semester, and 58.1% of students chose to use a mobile phone. However, grades in the courses did not differ based on whether the student chose to use a clicker or a mobile phone; higher percentage of correct responses of questions on either polling device was associated with higher exam grades. Students also perceived both devices as positive. The main problems cited by the students about the mobile phone were difficulty connecting to the Internet at times and being distracted by their device. Overall, though, Stowell (2015) concluded that clickers and mobile phones are likely similarly effective.

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#### WHY DO PERSONAL RESPONSE SYSTEMS WORK?

Clickers have been shown to improve student engagement (Stowell & Nelson, 2007). Actively participating and seeing the results in real-time allows students to be more present in the classroom and have a more unique interaction with their peers and the instructor. In addition, Shapiro and Gordon (2012) found that clickers likely work by enhancing students' memory through increasing exposure to the material and helping students practice answering questions.

Son and Rivas (2016) indicated that using analogical reasoning questions via personal response systems allow students to transfer and apply knowledge in an existing domain to a new domain. They conducted a quasi-experimental study in which one class was assigned to a "testing" group and another was assigned to a "notes" group. Both groups used the clickers, but the testing group received analogical reasoning questions and the notes group did not. They found that the testing group performed better on the final exam than the notes group suggesting that the analogical reasoning questions were helpful in generalizing knowledge.

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#### INTRODUCTION TO A CLASSROOM MOBILE PHONE APPLICATION: SOCRATIVE

While there are a number of mobile phone applications to use in the classroom, this chapter will focus specifically on Socrative. Socrative is an application that was designed to be used as a personal response system in the classroom. The free version allows instructors to have one public room and can use the system with up to 50 students per session. It is available on most computer platforms (e.g., Microsoft Windows, MacOS, Linux) and on most mobile devices (iOS, Android, Kindle). The creators recommend using the most recent versions of Chrome, Safari, or Firefox browsers to launch Socrative.

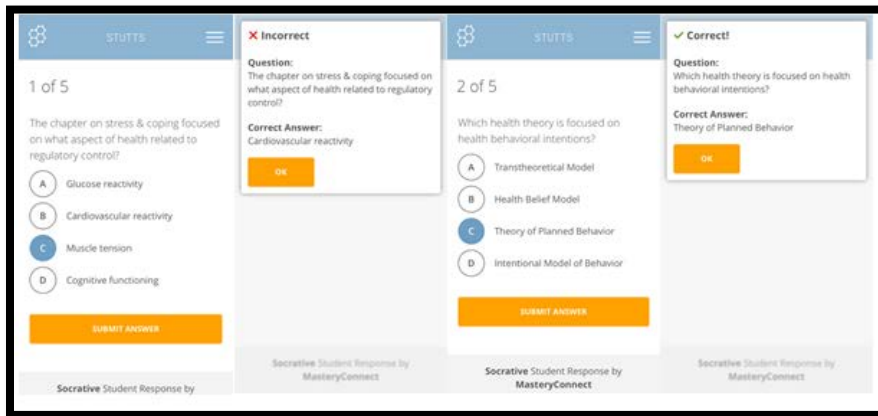
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#### SETTING UP SOCRATIVE

Instructors set up accounts through the Socrative website ([www.socrative.com](http://www.socrative.com)) and can use the website or the "Socrative Teacher" phone application to launch it. The instructor creates a "room number" that students use to log in. Students only have to download the free "Socrative Student" phone application or go to the website to login as a student. They login via the designated room number and then wait for the instructor to load a question. Instructors can easily set up "quizzes" where they can add multiple choice questions, true/false questions, or short answer questions ahead of time. They can also designate correct/incorrect answers. If instructors already have questions set up in an Excel document, they can be imported into Socrative.

## LAUNCHING PRE-MADE QUIZZES

When launching the quiz, instructors choose from allowing the students to receive instant feedback on whether or not their answers were correct, allowing students to have open navigation where they can change answers and go back and forth between questions, or allowing instructors to take control of when each question appears on the screen. An example of what the student's screen looks like when he or she answers questions incorrectly or correctly below.



In addition, instructors decide if they want to require names for the quizzes and whether they want the questions/answers shuffled across students. Once the quiz begins, instructors receive feedback in real-time about students' responses. Usually instructors do not show this screen to students as to not embarrass students who are not performing well. Instructors can subsequently download the answers and scores into an excel document and use as part of a class grade. An example is shown below.

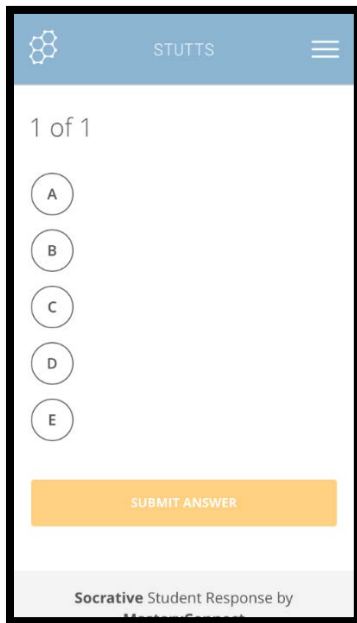
Student Names	Total Score (0 - 100)	Number of correct answers	The chapter on stress & coping focused on what aspect of health related to regulatory control?	Which health theory is focused on health behavioral intentions?	Which is an example of secondary prevention?	According to Sapolsky, what aspect of a job is most related to stress?	Salposky emphasizes that predictability consistently reduces stress, regardless of the situation.
Hermoine	80	4	Muscle tension	Theory of Planned Behavior	An individual has early signs of osteoporosis and is given a recommendation to eat more calcium/Vitamin D.	How much control you have	False
Harry	40	2	Glucose reactivity	Health Belief Model	An individual has early signs of osteoporosis and is given a recommendation to eat more calcium/Vitamin D.	How much control you have	True
Dumbledore	100	5	Cardiovascular reactivity	Theory of Planned Behavior	An individual has early signs of osteoporosis and is given a recommendation to eat more calcium/Vitamin D.	How much control you have	False

Instructors can also disseminate quizzes through a “space race” where students are automatically randomized to a team color, and if anyone in their team color gets a correct answer, a spaceship in that designated color moves forward on the screen. This option can help increase engagement and inspire motivation in students to complete questions correctly.

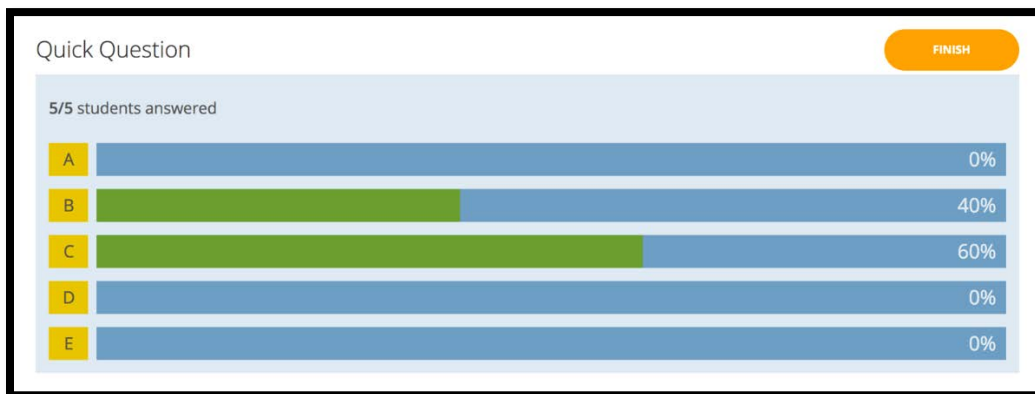
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### LAUNCHING QUICK QUESTIONS

Many times instructors will have a question that is not pre-made. Instructors can use the “quick question” option for this reason. When launching a quick question, instructors pick from multiple choice, true/false, or short answer. On the students’ screens, they will see A through E options for multiple choice (see figure below), T/F, or a blank window in which they can type an answer.



The instructor needs to identify for students what the question is and what the options are (typically done verbally, on a whiteboard, or on a PowerPoint). The answers appear in real-time and are anonymous. Therefore, these answers are typically shown to the students (See figure below).





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## LAUNCHING EXIT TICKETS

Instructors may want to launch an “exit ticket” at the end of the class period to assess how the overall class went. There are three automatic questions that are asked when the exit ticket is launched: 1) How well did you understand today’s material? (i.e., totally get it, pretty well, not very well, not at all), 2) What did you learn in today’s class? (open-ended), and 3) Please answer the instructor’s question (open-ended). For the last question, the instructor would designate a specific question based on the class material for the students to answer.

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## SOCRATIVE PRO

Socrative came out with a “Socrative PRO” option, which requires paying for a license. It allows instructors to have up to 10 private or public rooms and allows for up to 150 students per session. In addition, it has more customizable options as well as the ability to import class rosters into the system, among other perks.

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## USING SOCRATIVE IN A PSYCHOLOGY CLASSROOM

Socrative works well in introductory and intermediate courses that are too large for frequent individual participation by every student. I use it in my courses that have 32 students but not in my smaller, discussion-based classes that have only 12 students. It could easily work for any type of psychology course topic. In this section, I first describe how I introduce Socrative to students and then describe the four main ways I use it in my classes.

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## INTRODUCING SOCRATIVE TO STUDENTS

On the first day of class, I make it clear to students that they will be using their smartphones in class as one method of communicating with me. I also include information about it on my syllabus: “Technology etiquette: You are encouraged to bring a Smart device with you for classroom activities. We will be using an application in which you will submit attendance and answers to questions. However, your devices should be set to silent, and you are not allowed to use your devices for activities unrelated to class.” I also ask students to let me know if they do not own a smart device the first week of class, so I can provide them with one. However, I have never had a student that did not have access to any form of smart device (smartphone, iPad, and laptop devices all work). The first week of class, I have students download the “Socrative Student” application for free on their smartphones or iPads. If they are using a computer, then they go to this website: [www.socrative.com](http://www.socrative.com). Subsequently, they login to my last name as the “room number.”

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## ATTENDANCE AND LATENESS

The first way I regularly use Socrative is taking attendance. As soon as students arrive in class, they are responsible for logging into Socrative and entering their name. I also have a question of whether they were late or not to class. This information is stored in an Excel file, which I download after class to note which students were absent and which students were late.

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## FORMATIVE ASSESSMENT

The second way I use Socrative is through formative assessment by using the quick question option. The first question I ask at the beginning of every class is a review question from the previous class. I encourage them to review their notes as they wait for class to begin in preparation for a review question. In addition, I include formative

questions throughout the class to assess if they are learning the material. If a majority of the class misses a question, then I spend more time reviewing that topic. I also review why certain answers are incorrect.

### ANONYMOUS POLLS

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The third way I use Socrative is by taking anonymous polls about personal topics through the quick question option. For example, when I teach a class on child maltreatment, I poll the class to see how many students experienced spanking as a punishment as a child. These results show up as aggregate data and do not identify any student. Another example would be to ask an opinion question such as “Should adolescents be tried as adults for capital offenses?” After seeing the distribution of responses, a good discussion often emerges from the students with differing responses.

### FORMAL SURVEYS/QUIZZES

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Lastly, at several points throughout the semester, I administer pre-made surveys via Socrative. For example, the first week of class, I have students answer questions about their demographics, major, need for accommodations, and personal preferences in order to get to know them better. I also use surveys to collect feedback about their class participation and group members’ participation. In some classes, I use weekly low-stakes quizzes where I prepare five questions ahead of time about the material. The students receive feedback about whether or not they answered each question correctly and are given a score at the end. I receive their total score as well as their responses to each question in real-time and can download it into an excel file.

### ADDRESSING CHALLENGES

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Technology can malfunction at times. For example, if the Internet or the Socrative server is down, then Socrative will not launch. However, that has only occurred once in my four years of using this software. Sometimes a student’s individual device is not working. In that case or if a student forgets his/her device, I have one to two extra devices on hand for them to use.

Furthermore, sometimes there are student problems with the devices. For students who become easily distracted by their devices, I ask them to stay logged in to Socrative for the entire class and to put their phone upside down when they are not responding to a poll question; this helps reduce the likelihood that they will be distracted by any incoming messages. Students could technically also share answers if they showed their phones to their peers; however, I had not noticed this to be a problem, especially since I use it in a low-stakes capacity.

### CONCLUSION

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Overall, using technology in the classroom can be advantageous. As technology evolves, instructors will need to be flexible in adapting to the changing technology and software. Future research should explore the optimal frequency and length of time used with technology in the classroom and what activities and specific applications are most expedient to promote student learning. In addition, finding out how to make technology work for all students is another area that should be investigated. Ultimately, integrating technology in the classroom is highly valuable as our society will likely become increasingly dependent on it for work and daily functions.

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# A SURVEY OF EFFECTIVE BLOGGING PRACTICES

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## INTRODUCTION

This chapter explores the use of web logs, more commonly known as blogs, in higher education. Blogs allow non-technical users to quickly and easily publish material on the world-wide web (Ifinedo, 2017). Most blogs allow readers to write comments, so that a discussion of the original post may ensue. Many course management systems such as Blackboard, Canvas, and Moodle have a blogging module ready for use, and some online services offer blogging services for free. They can be an excellent way to allow students to communicate with one another, their instructor, and the larger community outside of the classroom. Blogging often consists of writing a short analysis on a course concept or commenting on another student's ideas. Blogging can also overlap social media functions, such as sharing a link, darting off a quick one sentence thought, or posting a photo. These can help students understand and absorb course material in a way that enhances what happens inside the classroom. We will consider the different blog types, the theoretical basis for their use, and research examining their effectiveness in various courses that inform best practices of blogging.

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## WHY USE A BLOG?

Gill (2006) lists four qualities of what makes blogs and other online discussion forums effective: Efficiency, openness, sense of safety, and spirit of collaboration. Efficiency, or ease of use, refers to writing blogs easily. Next, after students post their thoughts, they are readable and ready to be commented upon by the instructor, other students, and community members. Third, students have a sense of safety in which a student might voice an idea or opinion they would not in a classroom environment, because they feel the blog space is their own (Hew & Cheung, 2013; Kim, 2008). Lastly, blogs promote a spirit of collaboration by allowing blog users (students, instructors, and others) to build off everyone's ideas to create a shared idea space. Deng and Yuen (2011) stressed the use of blogs as both reflective and interactive discourse. They allow students to take the material they learned in the course, reflect on it, and produce their own material.

Instructors and researchers can use blogs to foster a constructivist learning environment, where students are actively engaged in constructing knowledge instead of merely receiving it from the instructor (e.g., Kuo, Belland, & Kuo, 2017; Lee & Bonk, 2016; Miyazoe & Anderson, 2010; Osman & Koh, 2013). These technologies can promote Socratic questioning, peer review, and self-reflection. Other researchers have noted that blogs encourage critical thinking (e.g., Ellison & Wu, 2008; Oravec, 2002). Oravec (2002) discussed how traditional blog entries usually require students to transform the content into their own words versus merely repeating course concepts. In short, these positive features of blogs provide a space for student meaning-making on their own terms using these constructivist principles.

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## TRADITIONAL BLOGS

In a traditional blog, posts can be several paragraphs long, with entries usually arranged in reverse chronological order (Halic, Lee, Paulus, & Spence, 2010). Previous posts are commonly retained. Most blogging software allows for readers to comment on the entry, allowing for a threaded conversation to follow the initial post. Within this space of traditional blogs, two main types exist: Group and individual. In a group blog, all students are responsible for providing and keeping up the content of the blog. Conversely, with the use of individual blogs, each student maintains their own blog space.

Although research examining specific learning outcomes from student blog writing is lacking (Hew & Cheung, 2013; Sim & Hew, 2010), there is research and scholarly literature focused on student attitudes towards blogs. Research has found that students like and appreciate the use of blogs in a course, though as with any intervention there are pluses and minuses (e.g., Halic et al., 2010; Kuo et al., 2017; Sullivan & Longnecker, 2014; Top, 2012). In a typical finding, Top (2012) noted that undergraduate students held significantly positive attitudes about the collaborative and perceived learning potential of the blog assignment. These students used blogs to assist in a larger group project they had been assigned. Sullivan and Longnecker (2014) had students work on a group blog, and found students felt they communicated more with their fellow students on an intellectual level, and believed they were motivated to write better because their peers would see their work. In this particular study, students wrote blog posts throughout the semester on scholarly articles they had read for class, and commented on a certain number of other student's blog posts. However, some researchers have found students are less interested in maintaining shared blogs in comparison to individual blogs, perhaps due to the issue of ownership (Kim, 2008). Not surprisingly, there is a diffusion of responsibility with shared blogs, and students feel less responsible for maintaining its content. Walatka (2012) used a hybrid model, where students started work on a class blog (the "hub") and then as the semester progressed moved toward writing individual blogs (the "spokes"). He found that this model had a significant and positive impact on how both students and the instructor approached the class, because students were better prepared for class, allowing for deeper discussions to happen both inside and outside of class time.

It is also worth noting that the scholarly literature suggests that students believe individual and group blogging assignments are useful, but do not like some aspects of it (e.g., Deng & Yuen, 2013; Duarte, 2015; Ellison & Wu, 2008; Halic et al., 2010; Samuel-Azran, & Ravid, 2016). This finding appears to hold in both group blogs (Duarte, 2015) and individual blogs (Deng & Yuen, 2013). For example, Deng and Yuen (2013) found that students liked to read other students' blog posts, but thought less of commenting on other students' blog posts and receiving comments back on their own posts. Blogging enabled a feeling of increased social connectivity, but did not enable social interactivity to the same extent, allowing students to connect with each other via their blog writing. Deng and Yuen concluded that blogs might fill a role between formal written assignments and casual written communication. Indeed, in many studies the findings indicate that the students enjoy the less formal nature of writing typical of blogs, and felt that it improved their writing (e.g., Sullivan & Longnecker, 2014).

Related to social connectivity, researchers have examined how using blogs over the course of a semester changed who communicated with whom within the course. Lee and Bonk (2016) developed network graphs of how students knew each other at the beginning and the end of the semester. The number of both incoming and outgoing connections for each student increased during that time frame, showing that indeed students increased in their connectivity. Students reported they felt closer to their peers at the end of the course.

Researchers have also examined the content of the blog posts and found that students put effort into the posts, fulfilling the constructivist goal of a meaning-making exercise where students internalize course content. For

example, Dos and Demir (2013) found students wrote in their own words and constructed their own knowledge versus merely parroting back course content. Miyazoe and Anderson (2010) discovered that vocabulary use among their English as a second language students became richer in blog posts than it was in forum posts, indicating that students realized the difference in intent between these two types of writing and adjusted appropriately. Lastly, Osman and Koh (2013) performed a content analysis on their students' blog posts. They noted high levels of critical thinking, with the ability to link course concepts to real-life examples.

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## MICRO-BLOGS

In contrast to a traditional blog, a micro-blog is very short in length. Users post small pieces of digital content in the form of text, photographs, short videos, or links (Educause, 2009). Other users can add comments below the original post but those comments are also limited in length. The best-known micro-blog platform is Twitter with approximately 68 million users (Fiegerman, 2017). It allows users 280 characters of text per message. Messages appear on users' profiles and in the twitter feed for their followers. Other micro-blogs include Posterous, FriendFeed, Tumblr, Dailybooth, 12 seconds, Plurk, and Jaiku (Educause, 2009). While less popular for educational purposes compared to Twitter, the platforms mentioned above offer interesting user variations in experiences. For example, on Tumblr users can post text as well as other media. Plurk users can have threaded conversations where discussions can occur.

Should student preferences affect what social media, particularly micro-blogs, are used in classrooms? Although student preferences do not always correlate with learning outcomes, they can still be useful in thinking intentionally about the teaching methods we choose to employ. This is especially true when we embark on new techniques like micro-blogging that hold the possibility of crossing boundaries into personal space in the way social media technology does (Gikas & Grant, 2013; Roblyer, McDaniell, Webb, Herman, & Witty, 2010). What we notice is that student views are always changing most likely because the technology itself is changing as are people's comfort in using it. Within our own research (Fleck & Hussey, 2017; Fleck, Richmond, & Hussey, 2013) we have observed this change in student preferences. In these studies, students were asked about the appropriateness and implementation of YouTube, Facebook, and Twitter in the classroom. Overall, the percent of students who had been asked to use social media in the classroom significantly decreased from 56% in 2012 to 42% in 2017. In 2012, when asked to use social media in class, 43.7% indicated they were excited yet in 2017 when asked the same questions only 29.8% responded excited. Focusing on the micro-blog platform Twitter, perceptions of its appropriateness for classes increased slightly from 29.2% in 2012 to 30.4% in 2017. Of course this means that in 2017 69.9% still view Twitter as not appropriate. In 2012, 7% of students had been asked to use Twitter for a class and in 2017 this held steady at 8%.

From the survey numbers reported above, it seems that positive perceptions and the use of micro-blogs is declining (Fleck & Hussey, 2017; Fleck, Richmond, & Hussey, 2013). However, others have not found this to be true. Neier and Zayer (2015) found openness to using social media in education, though not blogging specifically. They reported being motivated by its possible use for interaction and presenting information. Communication and collaboration potential uses were themes present in Fleck and colleagues (2017) data as well as others (see also Johnson, 2011; Lowe & Laffey, 2011; Wright, 2010).

Micro-blogs have been used in different ways in education. Twitter can be used as a backchannel forum where students ask questions during a live class (Educause, 2009). A backchannel is a private online space where conversations can occur while another activity is going on (Byrne, n.d.). For example, students could tweet questions

or thoughts live during a class period. However, this requires the use of a teaching assistant to monitor the Twitter feed especially because inappropriate messages or any objectionable material would need to be deleted right away. More often micro-blogs are used in a non-synchronous way, such as sending out reminders of course due dates, notifications of class cancelations, or to collaborate among students (Educause, 2009). Tarantino, McDonough, and Hua (2013) presented a strong case that social media platforms, such as blogs, help foster collaborative and social learning as well as create a virtual community of learners that helps students feel more connected with peers (Jackson, 2011; Tomai et al., 2010). Tarantino and colleagues argued that the virtually created community contributes to more discussion, and when coupled with critical analysis of course content seemed to increase perceived learning.

Teams of students can also use micro-blogs. Students can share multiple points of view, send virtual, motivating messages to each other (Educause, 2009), or can link each other to relevant research from the web. In this way, micro-blogging platforms are used to help students co-create and discuss information (Tarantino et al., 2013). Junco, Elavsky and Heiberger (2013) mapped Twitter assignments onto Chickering and Gamson's 1989 principles of good practice in the education of undergraduates. They mapped Twitter into their course by including for low-stress question asking, book discussions, campus event reminders, class reminders, organizing service learning projects, organizing study groups, academic and personal support, optional assignments, and facilitating class discussions. After studying their approach, the authors found that faculty participation and having a strong theoretical foundation for use were important components for improved outcomes.

The growing empirical literature related to the impacts of micro-blogging on student learning is promising. Junco, Heiberger, and Loken (2011) found that students who used Twitter increased their engagement, from the start of the class to the end, significantly more than the control group. Engagement is noteworthy because it is a predictor of learning (Kuh, 2002; 2009). Overall GPA was also higher for the Twitter students controlling for preexisting academic ability. Blessing, Blessing and Fleck (2012) also examined Twitter use on learning outcomes. All students used Twitter, though only half received tweets relating directly to course content. The other half received an equal number of humorous tweets as a control. The group receiving content-focused tweets performed better on test items relating to those tweets. The authors concluded that the tweets allowed students to reflect on class material for a few additional moments outside of class, creating a basic cued recall task that appeared to be beneficial.

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## PHOTOBLOGS

Depending on pedagogical purposes, instructors might consider the use of photoblogs to achieve positive student learning outcomes. Photoblogs are like blogs, but the main form of communication is through photos or image-based media and minimal text (Cohen, 2005). There are several online tools, including popular photography websites and portfolios (e.g., Photoshelter, Zenfolio, FolioHD) as well as social media sites that focus on image-based communication (e.g., Pinterest). Such platforms offer a new medium for instructors to create visual presentations of course content as well as for students to apply content knowledge to their surroundings and life's moments. Further, the use of social media can be used to engage students outside the classroom and build course community (Al-Bahrani & Patel, 2015; Phua, Jin, & Kim, 2017). However, it will be important for the teacher to set clear guidelines on how the tool is to be used, monitor appropriate usage, and have an action plan in place should the guidelines be violated.

Three popular photoblogs are Snapchat, Instagram, and Flickr. Snapchat is an online instant messaging application that allows users to send videos or pictures, called "snaps" to other users. Tools exist within the app allowing users

to include text, emojis (small images used to express emotion, such as a happy face), and stickers on their photos. Snaps can be shared with selected individuals or to one's own "story," but are deleted from the Snapchat interface after a certain length of time, varying from seconds to hours depending on the type of snap. Users can record snaps using other tools (e.g., taking a screenshot of a snap), resulting in a potentially permanent and sharable record (Bayer, Ellison, Schoenebeck, & Falk, 2016). Instagram and Twitter are very similar in terms of operational structure and functionality, with the main difference being the focus of image sharing on Instagram (Al-Bahrani & Patel, 2015). Like other image-sharing platforms, Instagram provides users with several tools to enhance or alter their photos prior to posting (Al-Ali, 2014). Lastly, Flickr focuses on image management and organization, allowing users to go beyond albums and create their own image groups based on digital metadata. In addition, this application is owned by Yahoo! and has access to some additional features that some image-sharing platforms do not, such as geographic tagging with Yahoo! Maps (Campbell, 2007).

Although photoblogging has quickly risen in popularity among social media users, the empirical research around its use is still growing (Al-Ali, 2014; Grieve, 2017). The descriptive scholarly literature appears to be in consensus that users of image-based sharing platforms tend to use these applications as a form of communication through pictures (Bayer et al., 2016; Grieve, 2017). Campbell (2007) highlights how these visual communication applications help break down barriers between students with English as a second language. Further, educators highlight their importance to better meet the learning needs of younger generation college students who are more visual and want to be involved in the creation of knowledge (Bussert, Brown, & Armstrong, 2008).

Like other social media used for communication outside of class, image-based communication platforms offer students an opportunity to share their thoughts and ideas with their peers for those who might not be comfortable speaking in class (Punyanunt-Carter, De La Cruz, & Wrench, 2017). Pittman and Reich (2016) found this use of image-based communication was related to decreased loneliness in students, in comparison to text-only communication. Other researchers have found Snapchat interactions were related to more positive moods versus other forms of communication (Bayer et al., 2016).

Bussert and colleagues (2008) had students create a Flickr photo stream as a project demonstrating information literacy concepts. Although no direct learning outcomes were analyzed, students reported the use of Flickr helped them to build community and get to know their peers, as well as a fun way to learn course content. Others have found Instagram use increased teacher perceptions of student learning and production of quality work (Al-Ali, 2014). In addition, image-based communication tends to be related to decreased misinterpretation of message (Punyanunt-Carter et al., 2017). Students have also reported that photoblogs have helped them learn how others perceive the world (Fleischmann, 2014; Guertin & Young, 2009).

Image-based applications might also increase comprehension, recall, and accessibility of certain curriculum components (Paige et al., 2017). Although the use of photoblogs did not increase content knowledge, Castañeda (2011) found they aided students in the recognition of key concepts in the course. However, it should be noted that this treatment group also included the use of videoblogs. Additional research is warranted to determine the isolated impact of incorporating photoblogs as a learning tool.

In terms of choosing a photoblogging platform, instructors might let students choose the image-sharing platform that best suits their learning and mobile application preferences. For example, Castañeda (2011) let students self-select whether they would be in a blogging or wiki project group based on whether they preferred to work individually or in teams. Al-Ali (2014) had students share a photoblog using either Twitter, Tumblr, or Instagram,



with all students choosing Instagram. Campbell (2007) preferred the use of Flickr, providing several helpful suggestions for teaching and learning opportunities using it. Regardless of the image-sharing platform, photoblogs appear to be a useful tool for engaging students in course content, getting them involved in knowledge creation, and breaking down communication barriers (Campbell, 2007; Paige et al., 2017; Punyanunt-Carter et al., 2017).

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## INCORPORATING BLOGS INTO YOUR COURSE

What should you consider if you decide to utilize some type of blog in your classroom? The first point we want to emphasize is to simply apply your already existing teaching practices to blogging. For example, we know that great teachers give clear feedback and do so often and early (Chickering & Ehrmann, 1996). As a very practical consideration, when giving feedback on a blog make sure you are not violating Family Educational Rights and Privacy Act regulations, called FERPA for short, (Educause, 2017; Rafferty, 2017). Consider if the feedback should exist on the blog at all or should be delivered via a private email or on the official learning management system. Another example is that great teachers provide clear directions for assignments with well-defined expectations for success and that they provide many opportunities for students to practice what they have learned (Byrnes, 2008). Apply these principles to your blogging assignments.

Our next suggestion is to think about the authenticity of blogging. Is using this technology true to who you are as a teacher, scholar, and social person? Although blogging is fun and interesting, it might not be for everyone. If you are not genuinely interested in it as a learning tool or method, you should not use it. Students can tell when something is unfamiliar or when you do not buy into it yourself. Great teachers have a plan and purpose for what they do (Whitaker, 2004). Blogging will then become an unneeded stress for everyone. We recommend that you only adopt technology into your teaching that resonates with you. This will allow your students a real and genuine experience. If it does resonate with you, then implement it in a deliberate and intentional way.

What are the considerations that are unique to blogging? Blogging allows students hands-on learning experiences by creating pages, posts, or videos (Shatto & Erwin, 2016). Furthermore, it encourages collaboration (Tarantino et al., 2013) and promotes inclusivity (Shatto & Erwin, 2016). Make sure your blogging assignments reflect these facets by including group work or peer commenting, as well as guidelines that foster a safe environment for discussion. The group work could even focus on varying viewpoints to reinforce this (Shatto & Erwin, 2016).

Another consideration is to be mindful of your institution's official policy on digital media. If there is not a policy, you should work to create one with your department. The policy should be linked into your syllabus as well as the blogging assignment itself so that students are fully informed (Rafferty, 2017). It is also very important that your assignments follow the policy and that the policy itself is compliant with all Family Educational Rights and Privacy Act regulations (i.e. FERPA) (Educause, 2017). Privacy can be an issue when using blogging platforms. Ways to address this include using a work specific account rather than your personal account as well as using aliases or pseudonyms whenever possible to protect identities (Educause, 2017; Rafferty, 2017). You can also use your blog assignment to teach students how to be digitally responsible (Rafferty, 2017). Not all students will know what is appropriate to post and what is not, or issues regarding plagiarism. Digital media responsibilities include not posting things without proper publishing rights and understanding the consequences that can arise when you publish something not representative of yourself (Educause, 2017). Instructors should consider a clear statement in their syllabus outlining their expectations for use of technology and the consequences of misuse. However, keep in mind that these could be teachable moments and coming down too hard on students might not be appropriate. Such lessons will serve students well in their future careers and personal lives. However, students have not been the only

ones to inappropriately use social media. More and more universities and departments are adopting social media policies to govern faculty, staff, and student appropriateness of posts (Pomerantz, Hank, & Sugimoto, 2015). Therefore, it is important that faculty ensure they are following all department and institutional policies when implementing blogs in their courses.

Junco and colleagues (2013) recommend that instructors require students to use blogs rather than have it as an optional assignment; they specifically used Twitter. Students who were required to use the platform experienced greater engagement and academic benefits than students not so required. Second, they recommend blogging platforms only be used in educationally relevant ways. They found having a theoretical framework maximized its usefulness. Lastly, in their use of Twitter, they found strong instructor engagement on the platform positively impacted student outcomes.

Finally, we ask you to consider the amount of time you are requiring students to spend blogging. Average screen time for traditional college female students is 10 hours a day while males average almost 8 hours (Roberts, Petnju Yaya, & Manolis, 2014). Should we meet students where they already are (i.e., in the digital world on their phones) or should we encourage other academic venues for gathering, interpreting, and reporting on information? Some scholars suggest that mobile technology should be used whenever possible in the implementation of social media platforms such as blogging (Shatto & Erwin, 2016). This includes reading on tablets or smart phones or reinforcing concepts with videos on YouTube (Shatto & Erwin, 2016). Others have found that students are reluctant to use their devices for educational purposes. Gikas and Grant (2013) studied cell phone use in class for social media purposes such as Twitter. While the students considered mobile devices helpful, they were frustrated by device challenges, professors who were anti-technology, and the problem that devices can be a major distraction. There are some tools that can help with the latter. Focus Booster, Rescue Time, and Cold Turkey are applications that can help people stay focused on tasks by monitoring and tracking online use and even blocking out distractions. Each has its own functionality usually involving downloading an application or signing up on their website to activate their specific services.

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## CONCLUSION

Blogging can provide a rich educational experience for students, but instructors need to be mindful of these different considerations. As illustrated above, blogging can take many different styles, from longer pieces of discourse, to short tweets, and even to photographs. We encourage instructors to consider how best to authentically incorporate these kinds of experiences into their courses. As each of these uses can promote constructivist learning principles, blogs can be a good pedagogical tool to deploy under the right circumstances in any class.

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# #WORTHIT? INTEGRATING TWITTER INTO INTRODUCTORY PSYCHOLOGY CURRICULUM

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## INTRODUCTION

Founded in 2006, the social networking service (SNS) known as Twitter is now ubiquitous in the developed world. The site allows registered users to post short (280-character maximum) messages (“tweets”), which are then available for other users (depending on privacy settings) to read, reply to, or retweet. Users can direct their tweets toward other users by putting an “@” with their target’s username, or allow their tweets to be thematically archived by adding a “#” to the topic about which they are tweeting. As of the writing of this chapter, there were 328 million monthly active users of Twitter worldwide, 82 percent of whom used it via mobile phones (Twitter, 2017). Its cultural impact is widespread, as social commentators credit Twitter for energizing social movements ranging from the Arab Spring and Black Lives Matter to the 2016 election of Donald Trump, who has continued as U.S. President to use Twitter as his primary mode of communication (Luckerson, 2017).

Although not as popular as Facebook or Instagram among university students (Pew Research Center, 2016), Twitter, as a combination of a microblogging site with a social networking service (Junco, Heiberger, & Loken, 2011), is better-suited for use in higher education than other popular SNS sites because of its ease of use, topical searchability, and self-archiving features. The first author of this chapter witnessed both Twitter’s popularity among students and its potential to be harnessed as a teaching tool during one of his classes in the early 2010’s. A handful of students in his Social Psychology course used Twitter to communicate with each other during class, violating course policies about accessing social media, but at the same time providing insight into their opinions about course content and the instructor’s teaching methods. Upon discovery of the students’ in-class Tweets about the course, the students were given the option of writing a short review of research on the use of Twitter in the classroom instead of being penalized class participation points. The paucity of experimental studies on the effects of Twitter on student engagement in higher education at that time is what led to the study described in this chapter.

Fortunately, since that chance encounter with students Tweeting during class, experimental research on the use of Twitter in the classroom has grown, although it still lags behind studies about Facebook in educational settings (Fleck, Richmond, & Hussey, 2013; Tang & Hew, 2017). In this chapter, we will review such research, and introduce our own experiment performed in an introductory psychology course. While not an exhaustive or meta-analytical review, we hope to provide the reader with a context justifying our attempt to add to extant literature, and a rationale for our experiment’s design.

In quasi-experimental comparisons of integrating Twitter with coursework and other methods (including traditional teaching methods or other SNSs), results have been mixed. Junco and colleagues (Junco et al., 2011; Junco, Elavsky, & Heiberger, 2013) found positive results when comparing first-year health professions seminar class sections requiring Twitter with sections without a Twitter requirement, showing more student engagement and higher GPA for the Twitter sections. Welch and Bonnan-White (2012), however, found no effect on student engagement when

comparing sociology and anthropology courses requiring and not requiring Twitter, although they did find a positive relationship between self-reported Twitter enjoyment and perceived engagement.

Blessing, Blessing, and Fleck (2012) compared psychology class sections where instructors tweeted either daily course-related material or daily jokes, and found that students receiving the course-related tweets remembered more concepts than those receiving the joke tweets. Kassens-Noor (2012) in a small, exploratory, mostly qualitative study, allowed students in an urban planning course to choose to either tweet or keep diaries relating to environmentally unsustainable practices they witnessed, and found that students in the Twitter group identified more unsustainable practices, but recalled fewer practices and generated fewer remedies for those practices, compared to the diary group. Kim et al. (2015) used in-class pop quizzes requiring students to tweet a response as quickly as possible (similar to typical clicker practices) in large engineering lecture courses, finding that a section utilizing in-class pop quiz tweets performed better on exams than a section taught without in-class tweets. It is notable, however, that in these three studies, tweets were either generated by the instructors (Blessing et al., 2012) or in direct response to instructor prompts (Kassens-Noor, 2012; Kim et al., 2015), as opposed to being independently student-generated.

Munoz, Pelligrini-Lafont, and Cramer (2014) allowed for independent student-generated tweets in their study comparing an online teacher education course section using Twitter, an online section using a Blackboard-based (Learning Management System) microblog, and a face-to-face section using Twitter. In this study, students in the Blackboard-only condition felt more engaged and connected with other students than students in either of the Twitter conditions, but the study's sample only included 46 total students and the authors only provided descriptive statistics, thus limiting this claim's ability to be generalized or internally valid.

Kuznekoff, Munz, and Titsworth (2015) were able to simulate a classroom setting via a true experiment in which participants were randomly assigned to one of several conditions including whether they were texting while taking notes, tweeting while taking notes, or simply note-taking during a lecture they would be later quizzed about. Participants performed better in the note-taking-only condition than in the tweeting condition, even when they were asked to tweet about lecture content, suggesting that tweeting while in class can be more of a distraction than a help.

The lack of consistent findings from the aforementioned studies points to the need for more research on the use of Twitter in education, at least as long as Twitter remains ubiquitous in popular culture. Large-scale reviews have been relatively scarce, as well, but are presented here to conclude this introduction.

Gao, Luo, and Zhang (2012) performed an early critical analysis of studies about microblogging in education published from 2008 to 2011, reviewing 21 studies. They highlighted the need for more systematically designed research on using Twitter in education, noting that many studies relied on case studies or descriptive data. Alias et al. (2013) reviewed studies involving Twitter in seven journals from 2007 to 2012, but were only able to analyze the content of four articles, none of which utilized an experimental design or explored measurable outcomes of integrating Twitter into a course. Buettner (2013) reviewed "substantial" (p. 246) studies from 2006 through 2013 and found that 16 of 17 relevant studies showed positive student outcomes when using Twitter, but did not examine closely those outcomes besides a discussion of improved collaboration and teamwork through Twitter.

Fleck and colleagues (2013), in a chapter that would not be out of place in this current volume, reviewed research on SNSs and reported results from a then-unpublished survey of college students about their preferences in SNSs in



the classroom. The authors provided guidance about incorporating social media in the classroom in general, with a focus on both Facebook and Twitter. Grounding their recommendations in relevant learning theories, they concluded with useful suggestions for instructors wishing to implement SNS use into their classrooms, stressing the instructor's need for familiarity with the SNS, clarity in expectations provided to students, consistency in self-disclosure, awareness of privacy options, versatility in communication modes, cognizance of SNS post orders, and knowledge of current research about SNS in the classroom.

Tang and Hew (2017), in a comprehensive review of studies about Twitter from 2006 to 2015, identified and analyzed 51 studies that met their criteria of empirical, peer-reviewed articles dealing with Twitter's effect on teaching and learning in an educational setting. Of these 51 studies, only six involved experimental comparisons of Twitter to non-Twitter methods and utilized quantitative outcomes. This lack of rigorous comparisons led the researchers to posit that evidence of Twitter's causal effectiveness as a teaching tool remains to be seen, but it does have promise as a mode of communication (e.g., a "push" technology to send students course-related information, or for collaboration between students) and assessment (e.g., as an in-class response system).

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## THE CURRENT STUDY

With this shortage of controlled research on the effects of Twitter in a teaching and learning context in mind, we designed a quasi-experimental study to compare Twitter to traditional teaching methods in an introductory psychology course. True experiments, with each participant randomly assigned to a condition, are difficult to achieve in a real educational setting given that students in higher education choose their course sections based on a variety of both practical (e.g., time of day) and preference-based (e.g., reputation of instructor) reasons. It would also be logistically difficult for one instructor to structure a single course section with students in both Twitter and control groups. Thus, in the current study we employed a quasi-experimental design, with entire sections assigned to either use Twitter or not.

Based on previous research (e.g., Junco et al., 2011) showing positive effects of Twitter on student engagement, we hypothesized that students in courses utilizing Twitter would show more improvement in self-reported student engagement over the course of a semester than students in courses utilizing traditional teaching methods. We also explored the effect of Twitter quantitatively through examining potential differences in academic performance, as measured by course grades, semester grade point average (GPA), and overall GPA.

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## METHOD

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### PARTICIPANTS

We employed a quasi-experimental design with order counterbalanced between semesters and across sections. Eight lecture-based sections of introductory psychology participated in the study over four 15-week academic semesters. In Semester 1, the first author's introductory psychology section served as the treatment group, while the second author's introductory psychology section served as the control group. The assignment to treatment or control group switched each semester, following an ABBA pattern of counterbalancing for each instructor (see Table 1).

Table 1. *Number of participants in each group each semester.*

	Semester 1	Semester 2	Semester 3	Semester 4
SK section	Twitter ( <i>n</i> = 23)	Trad. ( <i>n</i> = 25)	Trad. ( <i>n</i> = 23)	Twitter ( <i>n</i> = 25)
MC section	Trad. ( <i>n</i> = 24)	Twitter ( <i>n</i> = 20)	Twitter ( <i>n</i> = 22)	Trad. ( <i>n</i> = 23)

Each section enrolled between 20 and 25 students, resulting in 90 students (55% female; 60% Freshman, 22% Sophomore, 13% Junior, 4% Senior) in Twitter sections, and 95 students (55% female; 59% Freshman, 26% Sophomore, 8% Junior, 7% Senior) in traditional sections.

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## MATERIALS

Students in treatment groups created Twitter accounts and shared their Twitter handle with their instructors.

We utilized the TAGS plug-in (API) for Google Sheets (version 5.0; Hawksey, 2013) to track user defined hashtags. The plug-in searches Twitter for tweets and retweets with the #SUPSY101 hashtag.

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## INSTRUMENTS

Students completed an online questionnaire through Qualtrics at the beginning and end of each semester. This questionnaire included demographic items and instruments measuring student engagement and social media use (discussed in more detail below). Instructors calculated academic performance after completion of the course.

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## STUDENT ENGAGEMENT

Students completed a modified version of the Student Engagement Instrument (SEI; Appleton, Christenson, Kim, & Reschly, 2006) at the beginning and end of each semester. Appleton et al., 2006) tested the original SEI with middle and high school students; we modified it to be appropriate for college students by removing items referring to “family/guardian” (e.g., “I’ll learn, but only if my family/guardian(s) give me a reward”) and changing occurrences of the word “teachers” to “professors” (e.g., “I enjoy talking to the professors here”). Our modified SEI contained 29 items with 5-point Likert response options from 1 (strongly agree) to 5 (strongly disagree), and includes subscales measuring Student-Teacher Relationships (8 items, Cronbach’s alpha = .86), Peer Support for Learning (6 items, Cronbach’s alpha = .84), Future Aspirations and Goals (5 items, Cronbach’s alpha = .73), Control and Relevance (9 items, Cronbach’s alpha = .78), and Extrinsic Motivation (1 item).

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## SOCIAL MEDIA USE

We asked students to answer questions regarding how much time per typical school day (in minutes) they spend: (1) using social media in general, (2) using Twitter, (3) using Twitter in relation to academics, and (4) using Twitter in relation to Introductory Psychology.

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## ACADEMIC PERFORMANCE

Following completion of each semester, we calculated students’ grade in the course (up to 100, after Twitter grade removed, if applicable), Twitter grades (up to 100, if applicable), semester GPA in all courses, and overall GPA in all courses.

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## PROCEDURE

Over the course of two two-semester school years, each semester one of us taught introductory psychology using traditional teaching methods (control group), and one of us taught with Twitter as a required component of the course curriculum (treatment group; see Table 1 for teaching order). For the sections comprising the treatment group, we integrated Twitter into curriculum as described below.

In the Twitter sections, we provided students with brief tutorials on how to use Twitter, and made clear our expectations for how it would be used during the semester. Each week, students had to compose at least one original tweet regarding something they learned about psychology during that week. These tweets could be informative, humorous, reflective, observational, or inquisitive, and follow standards of relevance and respect that we set for typical classroom discussion. Tweets not meeting these standards would not earn credit. Because we wanted students to generate their own tweets, we tended to not provide prompts. However, on occasion, we would tweet questions to the class that they could respond to, thus serving as a prompt to facilitate communication, or aid students who were “stuck.” These prompts were sporadic and not mandatory to reply to. A “tweet of the week” prize was used to enhance participation, with winners receiving token rewards. The only account requirements were that student accounts would be viewable by instructors, and that students used the appropriate hashtag (#SUPSY101) when tweeting content for the course.

In addition to award tokens, five percent of each student’s overall course grade was dedicated to the Twitter assignment in each section. Assigning a course grade to tweeting incentivizes the use of Twitter (Kassens, 2014). In our courses, tweeting at least one relevant message meeting the aforementioned standards per week would earn credit on an “all or nothing” basis for each week. Students in control sections did not use Twitter, thus the five percent was evenly distributed across other course related activities, such as homework assignments or quizzes.

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## DATA COLLECTION

During the first and last weeks of each semester, students completed a confidential online questionnaire assessing student engagement and social media usage, thus providing both pre- and post-treatment data. Students had the option of declining to provide data, even if their section was one utilizing Twitter, without any detrimental impact to their course grade. No students actively declined to participate, although some students were absent on data collection days. Pairwise deletion of missing data was used in analyses.

We measured performance through recording students’ course grades (measured as a percentage of points earned after removing points earned from Twitter). We also measured overall academic performance by recording student GPA for the semester they took the course and their overall GPA for their time at the university.

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## RESULTS

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### COMPARISONS OF TWITTER AND TRADITIONAL CLASS TYPES

We conducted a 2 (Twitter, Traditional) x 2 (Time 1, Time 2) mixed factorial ANOVAs for measures of engagement. Independent samples *t*-tests (Twitter, Traditional) were conducted on all academic measures.

Performing 2 x 2 ANOVAs for each engagement subscale revealed there to be only one main effect of time (comparing Time 1 scores to Time 2 scores): Student Future Aspiration scores declined at the end of the semester

compared to the beginning, across both Twitter and Traditional groups, but this effect was no longer statistically significant after making Bonferroni corrections. We found no main effects for the type of class, and most importantly, no significant interactions between time and type of class. The lack of significant interactions indicates that changes in student engagement over time were not dependent on whether students were in a Twitter or Traditional class type (see Tables 2 and 3).

Table 2

2x2 Mixed-ANOVA results for SEI sub-scale scores.

	Future Aspiration				Teacher-Student Relationship				Extrinsic Motivation				Peer Support				SEI Total			
	<i>df</i>	<i>F</i>	<i>p</i>	$\eta^2_p$	<i>df</i>	<i>F</i>	<i>p</i>	$\eta^2_p$	<i>df</i>	<i>F</i>	<i>p</i>	$\eta^2_p$	<i>df</i>	<i>F</i>	<i>p</i>	$\eta^2_p$	<i>df</i>	<i>F</i>	<i>p</i>	$\eta^2_p$
Time (T)	1, 166	4.46	.036*	0.026	1, 163	0.001	.973	0.000	1, 164	2.25	.136	0.014	1, 165	0.17	.685	0.001	1, 159	2.84	.094	0.018
Twitter Group (TG)	1, 166	1.11	.295	0.007	1, 163	1.96	.164	0.012	1, 164	1.67	.198	0.010	1, 165	0.04	.851	0.000	1, 159	1.17	.282	0.007
T x TG	1, 166	0.004	.948	0.000	1, 163	0.081	.776	0.000	1, 164	1.04	.310	0.006	1, 165	0.002	.961	0.000	1, 159	0.35	.555	0.002

Table 3

Descriptive statistics for SEI sub-scale scores (numbers in parenthesis are standard deviations)

	Future Aspirations		Teacher-Student Relationship		Extrinsic Motivation		Peer Support		SEI Total	
	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>
Twitter	17.83 (1.93)	17.46 (2.63)	33.69 (3.57)	33.59 (4.86)	36.32 (4.13)	36.15 (5.48)	24.84 (2.89)	24.94 (3.81)	116.82 (10.69)	115.85 (15.21)
Traditional	18.13 (2.07)	17.78 (2.11)	32.86 (3.45)	32.94 (3.89)	35.86 (3.98)	35.00 (4.57)	24.76 (3.11)	24.84 (3.14)	115.64 (9.23)	113.64 (9.98)

Analyses of the academic measures did not reveal any statistically significant difference between class type (see Tables 4 and 5).

Table 4

Independent samples t-test for academic measures between Twitter and traditional courses

	<i>df</i>	<i>t</i>	<i>p</i>	<i>Cohen's d</i>
Semester GPA	192	- 0.29	.773	0.05
Overall GPA	192	0.07	.942	0.01
Grade for PSY101	183	- 0.34	.733	0.05

Table 5

Descriptive statistics for academic measures between Twitter and traditional courses (numbers in parenthesis are standard deviations)

	<u>Twitter</u>	<u>Traditional</u>
Semester GPA	2.83 (0.78)	2.87 (0.77)
Overall GPA	2.94 (0.70)	2.94 (0.69)
Grade for PSY101 (%)	83.39 (9.42)	83.87 (9.87)

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## CORRELATIONAL ANALYSES

For each Time 1 and Time 2, we performed Pearson's correlational analyses to determine relationships between academic performance, social media usage, and student engagement variables across all students.

### TIME 1

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Extrinsic Motivation scores correlated negatively with students' grades in the course,  $r = -.163$ ,  $n = 177$ ,  $p = .030$ . Future Aspirations scores correlated positively with students' grades in the course,  $r = .171$ ,  $n = 178$ ,  $p = .022$ . In other words, prior to any instruction using Twitter or traditional methods, students who were less extrinsically motivated but more driven toward future goals were more likely to earn better grades in the course. We found no other significant correlations outside of those that would be expected based on scale content (e.g., student engagement subscales correlating with each other).

### TIME 2

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Extrinsic Motivation scores correlated negatively with both students' grades in the course,  $r = -.210$ ,  $n = 175$ ,  $p = .005$ , and their overall semester GPA,  $r = -.190$ ,  $n = 175$ ,  $p = .012$ , but correlated positively with time spent using Twitter in general,  $r = .202$ ,  $n = 174$ ,  $p = .007$ , and in relation to academics,  $r = .162$ ,  $n = 173$ ,  $p = .033$ . Across all students, those who were more extrinsically motivated tended to have worse grades, but spent more time using Twitter. Among students in the Twitter sections, there were large positive correlations between students' Twitter grades and non-Twitter grades in the course,  $r = .561$ ,  $n = 90$ ,  $p < .001$ , and overall semester GPA in all courses,  $r = .609$ ,  $n = 90$ ,  $p < .001$ . These strong relationships indicate that students who performed better academically in the course and in general tended to perform better in the Twitter-based portion of the course as well.

Diving deeper into the connection between student extrinsic motivation and time spent using academic-related Twitter, we found that among students in the Twitter courses, this relationship was positive,  $r = .221$ ,  $n = 84$ ,  $p = .044$ , but among students in the traditional courses, the relationship was not significant,  $r = .129$ ,  $n = 89$ ,  $p = .227$ . Converting the correlations to  $r^2$  effect sizes shows that the relationship between extrinsic motivation and academic-related time on Twitter for students in the Twitter sections was approximately three times larger than that relationship for students in Traditional sections ( $r^2_{\text{Twitter}} = .049$ ,  $r^2_{\text{Trad}} = .017$ ).

## CHANGE IN ENGAGEMENT

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When including difference scores (Time 2 - Time 1) for the SEI, we found that for students who were in Twitter sections, there was not a significant relationship between SEI changes over time and their grades in the course,  $r = -.176$ ,  $n = 76$ ,  $p = .128$ . However, for students in traditional courses, this relationship was positive,  $r = .222$ ,  $n = 85$ ,  $p = .041$ . These two correlations together indicate that the Twitter requirement may have moderated the relationship between engagement and course grades, such that improvements in engagement were unrelated to course grades in Twitter sections, but in traditional sections, the more students increased their engagement over the semester, the better grades they earned in the course.

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## DISCUSSION

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### INTERPRETATION & IMPLICATIONS

In this study, integrating Twitter into course requirements did not result in improvements in student engagement or performance. The lack of findings showing improvement in student engagement is unlike those of Junco and colleagues (2011, 2013), who found significant improvements in overall student engagement when including Twitter as part of course requirements.

The use of Twitter appears to function better as a community building tool where there is little to no face-to-face contact between individuals (Carpenter & Krutka, 2014). In Junco and colleagues' studies, students' courses were first-year seminars meeting only one hour/week. We taught all sections of the courses involved in this study in person, meeting either twice or three times per week, for a total of three weekly contact hours. Our course, Introductory Psychology, enrolls mostly first-year students (approximately 60% in our sample) but also includes upperclassmen, and occurred in both Fall and Spring semesters.

Junco and colleagues' (2011, 2013) experiments utilized seven sections of a course and took place over one academic semester, but it is unclear how instructors were matched to Twitter sections. Welch and Bonnan-White's (2012) study included two sections of each of two courses taught by two instructors, and occurred over one semester. Blessing et al. (2012) utilized two sections of a single course taught by two instructors during a single semester. Although our pre-test and post-tests were at the beginnings and endings of single semesters, by expanding our entire study to encompass four semesters, we could include more participants and account for environmental differences that might have varied systematically with requiring Twitter, had we confined it to a single semester, such as time of year (Fall vs. Spring), time of day the courses were offered (early vs. late morning), meetings per week (twice or thrice), or instructor variables (e.g., comfort level with Twitter, ability to establish rapport).

The correlational analyses we performed, while providing insight into relationships of course grades, engagement, and social media usage, were exploratory in nature and tended to provide more questions than answers. Some findings, such as those showing that students with higher future aspirations and who were less extrinsically motivated would earn better grades in the course, shed little light on the impact of Twitter as a teaching tool. The finding that students with better performance in the Twitter components of their courses were more likely to have better non-Twitter grades in the course and overall was not surprising.

Whether a student's section utilized Twitter or not moderated some small, yet notable relationships between other variables. In Twitter sections, students who were more extrinsically motivated at the beginning of the course spent more time tweeting about academics, but in traditional sections, this relationship was absent. Not all students have Twitter accounts, thus by incentivizing tweets in the Twitter sections with points and tokens, we provided extrinsic reasons for students to spend more time tweeting, but for intrinsically motivated students, the incentives may have mattered less.

The relationship between student engagement and academic performance was less strong and more nuanced than we expected, and merits further research. The only areas showing significant associations with academic performance were future aspirations (positive) and extrinsic motivation (negative), but student-teacher relationships, control and relevance, and peer support were not related to performance.

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## CHALLENGES & LESSONS LEARNED

When Twitter is used as a consistent part of the academic experience, the additional workload may result in “log-in” fatigue. This is reflected in negative sentiments shared by some students: “[...] not a huge fan of Twitter, it felt more like busy work to me [...]” or “[...] I am not sure that it really helps with anything. I don’t really use Twitter that often”. Moreover, it is likely that only students who enjoy using Twitter report increased engagement (Welch & Bonnan-White, 2012).

Similarly, not all instructors are active Twitter users. Having to actively monitor the class Twitter feed, learning Twitter etiquette (140 characters at the time of the study), responding to student tweets, and when to use Twitter specific labels (e.g., @ for mentions and #hashtags) took some initial adjustment. When tweeting, and responding to others’ tweets via mentions (@) instructors and students must remember to use the class hashtag. Not using the hashtag will cause the API to miss the conversation and potentially result in students being penalized incorrectly.

From a research perspective, teachers attempting to evaluate the effectiveness of integrating Twitter into their curricula should pay keen attention to their outcome variable(s), how they are operationalized, and whether outcome measures are sensitive enough to detect changes attributed to Twitter. Academic performance should be an objective and relatively straightforward construct, but student engagement may not be. In our case, the SEI and its subscales could have been measuring a broader sense of student engagement than what we were able to affect with the Twitter requirement. SEI items were phrased to refer to school in general, and not a specific course, e.g., “My professors are there when I need them” (Student-Teacher Relationship subscale) or “Other students at school care about me” (Peer Support subscale). If our courses were the only ones in students’ course-loads utilizing Twitter, its positive effects may have been washed out by dynamics of other courses.

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## RECOMMENDATIONS

For instructors who actively use Twitter, tweeting about academic content is likely not a time-consuming task. In fact, Twitter provides an additional avenue for professional development (see Krutka, & Carpenter, 2016). However, when tweeting is coupled to student grades, there is an additional time demand of ensuring that students are tweeting and that these tweets are graded in a timely manner. Therefore, an effective workflow should be established to reduce workload, e.g., reminding students to use the appropriate hashtag, setting a specific time to score tweets, utilizing automation to collate student tweets.

If Twitter functions as a means to engage students, then tweeting must be transactional. Students should be encouraged to respond to classmates’ tweets on top of their weekly tweets. Instructors should feel free to respond and possibly even “like” a student’s tweet where appropriate. In effect, this transforms the activity of tweeting into a conversation. By doing so, it makes tweeting more meaningful and reduces the sense that once a tweet is done and graded, it becomes lost to the Twittersphere. This transactional process provides a sense of community and receiving likes and garnering retweets are strong extrinsic motivators (Kassens, 2014).

The results of our study mirror the mixed findings in extant literature (Tang & Hew, 2017). At this point, we might even question if using Twitter is a worthwhile approach to engage our students. As educators, we are encouraged to engage the digital natives (students) in our classroom with tools that resonate with them. If we look beyond the null and mixed results, we can take pride in tweets that show learning transferring beyond the classroom, and also words of appreciation from students who understand our attempts to reach out to them.



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USING PECHAKUCHA IN THE  
CLASSROOM

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## INTRODUCTION

As instructors we want to present our class content in a way that is authentic, engaging, and enables our students to remember our message. Also, as educators there is a growing importance that we not only impart knowledge to our students but prepare them for life outside of the classroom (Rainie & Anderson, 2017). We strive to assist them in developing oral communication skills to be able to successfully navigate a job interview and effectively communicate with colleagues in their profession. How can we use technology effectively to guarantee this? We need to use a method of presenting that is engaging and prepares students to make professional presentations.

PowerPoint is commonplace in the classroom and at times misused by both the instructor and the student. Whereas the goal of a presentation is to engage your audience and communicate your point, ineffectively using PowerPoint can bore, confuse, and annoy attendees causing them to ignore your message. Too much information on the slides, lack of visuals, overuse of bulleted lists, overdoing it with animations, using too small font, odd color choices, awkward transitions, and excessive typos are just some of the ways that make PowerPoints an ineffective communication tool in the classroom (Satterfield, 2007; Tufte, 2003). Presenters using PowerPoint who spend more time reading the slides instead of paying attention to the message deliverer, attempting to cover too much material in the timeframe, goes over their time limit, and does not address the diversity of learners (e.g., visual, auditory) within a classroom are not using PowerPoint in an effective manner (Garber, 2001; Paradi, 2017; Tufte, 2003). Communication experts warn presenters regarding these misuses of PowerPoint and their impact on the audience's understanding of your message, at times stating that "PowerPoint is evil" (Tufte, 2003) and reminding us of "Death by PowerPoint" (Garber, 2001).

PechaKucha is a method of using PowerPoint that has shown to be more engaging, better received by audience members, and rated of higher quality than traditional PowerPoint presentations (Beyer, 2011; Byrne, 2016; Oliver & Kowalczyk, 2013; Soto-Caban, Selvi, & Avila-Medina, 2011; Widyaningrum, 2016). As instructors we can use this presentation method not only to present course content but also to train our students on how to prepare an effective and engaging professional presentation. In the sections that follow, we describe what PechaKucha style presentations consist of, what research supports their use in the classroom, challenges one may encounter when developing and utilizing PechaKucha presentations, and suggestions for how to incorporate this presentation method within your classroom.

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## PECHAKUCHA AS A PRESENTATION STYLE

PechaKucha (sometimes spelled Pecha Kucha) is a fast-paced, interactive, visual-based presentation style that is transforming how many conduct oral presentations. This creative presentation format was developed in Japan in 2003 by two architects, Astrid Klein and Mark Dytham, as a way to attract prospective patrons to their new event space (pechakucha.org). PechaKucha is Japanese for *chit-chat* or *chatter* (jisho.org) and is also referred to as the

20x20 style of presenting (Bang-Jenson, 2010; Freeman, 2016). This timed presentation technique consists of displaying 20 slides (mostly images) for only 20 seconds each, thereby making the entire presentation only 6 minutes and 40 seconds. PechaKucha presentations should be primarily graphical; slides should be predominately images with little to no text. Also, to keep the fast-paced momentum going throughout the presentation, slides should be set up to automatically advance every 20 seconds.

PechaKucha style presentations are an effective way to persuade others and communicate your message as they are longer than an elevator pitch, yet shorter than the 10/20/30 rule espoused by many presentation experts (see [https://guykawasaki.com/the\\_102030\\_rule/](https://guykawasaki.com/the_102030_rule/) for a description). Research has shown that this method of using PowerPoint is more engaging and audience members have similar levels of recall compared to traditional methods of using PowerPoint (Beyer, Gaze, & Lazicki, 2012). Instructors can use this method of presenting as a way to introduce a new content topic at the beginning of a class discussion or activity, as a way to provide a real-world example of a concept discussed in class, or at the end of discussion/activity as a way to recap the information learned. Students can use this presentation style as an individual or group presentation for a class assignment or as their final presentation for a research/writing project. This gives students experience speaking before an audience in a concise and professional manner. PechaKuchas have been used by instructors and students within the classroom (both K-12 and Postsecondary) (Byrne, 2016; Klentzin, Bounds, Paladino, & Johnston, 2010), as a presentation format at academic conferences (such as the American College Personnel Association, American Marketing Association, International Association for Social Science Information Services and Technology, and the European Educational Research Association), and at multi-speaker educational and community events, sometimes called “PechaKucha Nights” (for example: <https://utworks.tennessee.edu/micnite/Pages/main>).

PechaKucha is appealing in that it requires the audience to be much more engaged in the presentation (Allen, 2017; Anderson & Williams, 2012). It may also reduce mental fatigue by allowing the attendees to focus on the spoken word rather than jumping back and forth between the presenter and text intensive PowerPoint slides. Since the presenter has less than seven minutes to get their point across, they have to focus and create a more structured presentation that captures an audience’s attention and gives them more time for questions. Preparing students to make professional presentations (Byrne, 2016) is just one of the many benefits of utilizing this type of presentation methodology.

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#### BENEFITS OF USING PECHAKUCHA: ADVANTAGES FOR INSTRUCTORS AND STUDENTS

In the last fourteen years, PechaKucha presentations have gained significant popularity within the classroom. Research has shown that this style of presentation has been used successfully in educational settings in a variety of disciplines such as communications, nursing, marketing, psychology, and statistics by both instructors and students for presenting information on both simple and complex topics (Beyer, 2011; Byrne, 2016; Fewell, 2015; Levin & Peterson, 2013; Lucas & Rawlins, 2015; McDonald & Derby, 2015; Morrow, Kelly, & Shipley, 2017). One major benefit of PechaKucha presentations over traditional PowerPoint is how they are perceived by your audience. There is a plethora of research to support that PechaKucha style presentations are rated as more engaging and innovative than traditional PowerPoint presentations (Beyer et al., 2012; Klentz, Paladino, Johnson, & Devine, 2010; Lehtonen, 2011; Tomsett & Shaw, 2014). Byrne (2016) utilized PechaKucha presentations as an assignment with graduate nursing students. Students’ comments were overwhelmingly positive, stating “the PechaKucha format helped me learn to condense a large amount of information into small chunks” and “I learned how to narrow down only main points and not to be too wordy” (Byrne, 2016, p. 22). PechaKucha has also been shown to be just as effective as traditional PowerPoint presentations are for learning new information (Klentzin et al., 2010). Another benefit of this

presentation method is that it can be implemented in both traditional face-to-face as well as online classrooms. Within a traditional face-to-face classroom, teachers can hold a PechaKucha presentation event as the culminating student project. In a distance education classroom both students and faculty can create a digital recording of their PechaKucha presentation and deliver it either asynchronously or synchronously.

Other major benefits of PechaKucha have to do with its ease of use in the classroom. Researchers found that students took a similar amount of time to prepare using PechaKucha as their presentation style as they did using a traditional PowerPoint method of presenting (Beyer, 2011). Since this method of presentation is mostly visuals, students know that they will not be able to read their content off of the slides, so that forces a level of involvement and material knowledge with the assignment that might otherwise not be present; students will have to understand the essence of the concepts in order to present with visuals rather than just reading off text. The learning curve in order to successfully implement PechaKucha is small as it is easily utilized by those with a basic understanding of PowerPoint. Also, PechaKucha does not cost any extra to use; one just needs to have access to PowerPoint or another type of presentation software (e.g., Prezi). Since the presentation time is so short (under 7 minutes) it gives instructors the ability to schedule numerous student presentations within one class period if they are using this method of presenting as part of the students' assignment. For instructors it enables them to condense new course content into smaller, more manageable information chunks throughout their class period. When using PechaKucha as a presentation style one has to focus on the topic and understand the content in order to be able to present it under seven minutes. While there are many benefits to this method of using technology in the classroom, there can be challenges for both instructors and students in implementing it.

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#### CHALLENGES IN USING THE PECHAKUCHA PRESENTATION STYLE

While there are many benefits to using PechaKucha as a presentation method in the classroom there are challenges that instructors and students need to consider when creating and implementing this type of presentation. In regards to creating PechaKucha presentations, instructors and students need to think about choosing the most appropriate visuals for their presentation. An instructor does not want to choose a visual that is irrelevant and/or distracting to the audience. Students will need guidance on what types of visuals are appropriate and where they can find them. Also, when creating your PechaKucha the presenter must be focused on the message they are trying to convey. There is a limited amount of time to present concepts and there may not be enough time to present more complex concepts (Byrne, 2016). The instructor or student has to be sure that they fully understand the concept that they are trying to present on and be able to summarize the main points in under seven minutes. Another challenge is deciding whether or not to automate slides for the presentation. While many suggest that one should automate slides (Eriksen, Tollestrup, & Ovensen, 2011; Lucas & Rawlins, 2015), others (Bajaj, 2012; Edwards, 2010; Oliver & Kowalczyk, 2013) recommend against it as the transitions can increase the anxiety of the presenter and they can easily mishandle their timing (Swathipatnaik & Davidson, 2016). Those with little or no experience presenting may find it difficult to adapt to presenting with automated slides without a lot of preparation. Lastly, when creating a PechaKucha presentation the presenter must practice though not be too over-rehearsed that the presentation sounds canned and is uninspiring. Suggesting to students to practice their presentation in front of a test audience and/or recording their practice session is a great way for them to assess their readiness to present their PechaKucha style presentation in front of the class.

Other challenges have to do with the actual presenting of the PechaKucha presentation. It might be difficult for the presenter to respond to non-verbal audience cues during their presentation. Since the PechaKucha style presentation is so fast-paced, and in many cases rigidly timed, the presenter may not be able to adjust their message

based on the engagement and understanding (or lack thereof) of the audience. Also, because one is so focused on delivering the PechaKucha presentation in a specific style one might be so focused on giving the presentation versus having any time to manage public speaking anxiety symptoms. This is especially true for when students are presenting as they often report anxiety with presenting this type of presentation (Swathipatnaik & Davidson, 2016). A instructor can provide guidance and resources to students to help alleviate these challenges and ensure a successful PechaKucha presentation (see Table 1 for suggested resources).

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## SUGGESTIONS FOR INCORPORATING PECHAKUCHAS WITHIN THE COLLEGE CLASSROOM

How does an instructor get started using PechaKuchas in the classroom? How do instructors prepare PechaKucha and train students in using them? There are many researchers and presentation experts offering advice on what to do and what not to do (Brown, 2014; De Wet, 2006; Edwards, 2010; Fewell, 2015; Genzuk, n.d.; Jones, 2009; Jung, n.d.; Kandybovich, 2015; Lortie, 2016) when utilizing PechaKucha, either as a method presenting course material or for student presentations. Below is a summary of tips and strategies for making the most of PechaKucha presentations within your classroom. A list of PechaKucha resources and examples are also contained within the table (Table 1).

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**TABLE 1: PECHAKUCHA PRESENTATIONS TIPS FOR INSTRUCTORS AND STUDENTS**

**What NOT to do:**

1. Use a lot of text on your slides
2. Bullet lists of information on your slides
3. Read the information on your slides to the audience
4. Use a PowerPoint template that is distracting/busy
5. Include low quality or watermarked images
6. Incorporate more than two font types
7. Use red/green font colors (i.e., difficult for those that are colorblind)
8. Feature animation in your slides
9. Include irrelevant clipart and/or sounds
10. Have reference slides at the end of your presentation

**What you SHOULD DO (General Suggestions for both Instructors and Students):**

1. KISS....Keep it simple scholar; Your presentation should be clear, concise, and delivered well
2. Use only san serif fonts (e.g., Calibri, Gotham, Verdana) for any text that is on your slides
3. Text should be at least 28 point
4. Limit each slide to one idea or concept
5. Include mostly visuals on each slide; Visuals should all be high quality
6. Limit the number of visuals on each slide to 4 or fewer
7. Include ample white space on the slides
8. When using text use a dark background and light font; This is easier for your audience to read

9. Create an outline or storyboard of your presentation prior to creating your PechaKucha
10. Include minimal text and only text that are key concepts
11. Make your first slide capture your audience's attention
12. Be consistent with slide transitions (i.e., choose the same timing for all slides)
13. Practice but do not memorize your presentation
14. Use notes if necessary, just do not read everything verbatim
15. Tell your audience a story; Your slides should all flow together
16. View the slides in Presenter View so you can see the current and the upcoming slide
17. Include a discussion and answer session after the PechaKucha presentation
18. Keep delivering the presentation even if you finish your points prior to the next slide advances; Do not pause and wait for the slide to transition
19. Give your audience access to your presentation or a handout based on the presentation after you present so they can refer to the material at a later time

What you **SHOULD DO** (Suggestions for Instructors to Give to Students Using PechaKucha):

1. Provide students with detailed instructions on what you want to see included within their PechaKucha presentation (e.g., having a detailed assignment rubric)
2. Give students numerous resources on how to create PechaKuchas and how to find visuals to use in their presentations
3. Use one of your own PechaKucha presentations (recorded or demonstrate live in the classroom) as an example for students to use as a template when creating their own
4. Assign students to do a PechaKucha either alone or with a partner; both have been shown to be effective!
5. Experiment with modifications to the PechaKucha style to fit your classroom needs (e.g., less time, more time, video-based, team-presented)
6. Collect formative assessment (i.e., students perceptions of the activity and their suggestions for improvement) on the likeability and usefulness of PechaKucha presentations in your classroom

Helpful PechaKucha Resources:

1. <https://www.youtube.com/watch?v=l9zxNTpNMLo>
2. <https://www.youtube.com/watch?v=BSQlsgZWtV0>
3. <https://www.youtube.com/watch?v=32WEzM3LFhw>
4. <https://paulgordonbrown.com/2014/12/13/your-ultimate-guide-to-giving-pechakucha-presentations/>
5. [http://cmmr.usc.edu//Pecha\\_Kucha\\_TipsResourcesExamples.pdf](http://cmmr.usc.edu//Pecha_Kucha_TipsResourcesExamples.pdf)

Examples of PechaKucha Presentations:

1. <http://www.pechakucha.org/>
2. <https://utworks.tennessee.edu/micnite/Pages/main.aspx>
3. <https://www.youtube.com/playlist?list=PLxh6rM5tNqYij5Pzn4w0DrHqMHcDsu3So>  
(playlist of 19 videos; student examples)
4. <https://www.youtube.com/playlist?list=PLOOhndFHTtGOhgV1eWJb75XSkswFk0HF0>  
(playlist of 110 videos)

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## CONCLUSIONS

Visual aids can be effective tools for enhancing a presentation. At least 50 percent of the human brain is dedicated to directly or indirectly processing visual information (Smiciklas, 2012). Because of this, visual representations of information can make complex information much more easily digestible to an audience (Kelly, 2015). However, this distinction that visual aids should be built for an audience is sometimes lost on presenters.

Whether using PechaKucha or a traditional PowerPoint format, presenters, both instructors and students, must remember the purpose of a visual aid so that they can build and use one effectively: It is to be an assistant for the audience. Bokeno et al. (2006) break down this role of visually assisting the audience even further, specifying that a visual aid should:

- Clarify meaning
- Emphasize important ideas
- Make concepts more memorable
- Give your words concrete meaning

While a visual aid can certainly help keep a speaker on track by providing a concrete structure for a presentation, it should be designed to assist the audience, not the speaker.

Because utilizing PechaKucha style takes away the option to transcribe a presentation on slides (i.e., using just text in their presentation), using this format can assist presenters in remembering to make their slides audience-centric. Presenters using PechaKucha are tasked with finding or creating images that clarify and accentuate their words. The audience then benefits from these assisting images in that their visually-wired brains will be more easily able to create meaning from the content, which will make the concepts more memorable (Smiciklas, 2012). As with traditional PowerPoint presentations the presenter can easily ensure that their final PechaKucha presentation is understandable for all audience members by checking its accessibility (see <https://webaim.org/techniques/powerpoint/> for guidance). Instructors and students can create a more engaging and appealing presentation using the PechaKucha format.

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