Communicating Educational Research to Teachers Through Features of Social Media and Modeling on a Blogging Platform

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August 2014

A thesis submitted to McGill University in partial fulfillment of the requirements of the degree of Masters of Arts in Educational Psychology

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Abstract

In the field of education, there is a communication divide between researchers and practitioners (e.g., Vanderlinde et al., 2010; Anderman 2011; Cochran-Smith & Lytle, 1990). Researchers find it difficult to disseminate their results to practitioners efficiently (Chafouleas & Riley-Tilmad 2005; Huberman, 1993) and practitioners, among other difficulties, find research too complex to understand, synthesize, and apply in the classroom (Vanderlinde, 2010). With a blog that pairs educational theories with classroom activities, this study disseminated research to teachers in an understandable, applicable form. Participants were randomly assigned to one of three conditions that varied in levels of communication. The control condition was exposed to a static website with unilateral communication. The first experimental condition experienced a natural blog that allowed teachers to communicate with each other and the researchers, and the second experimental condition was exposed to a vicarious experience blog. This condition allowed for communication and included instances of implicit written modeling in the form of comments from confederate teachers (who were actually researchers) that detailed their experience with applying educational research in the classroom. Using a pre- and post-test assessments to evaluate teachers' level of educational research content knowledge, results showed higher levels of learning in the groups with the implicit modeling compared to the control condition, however no difference in learning outcomes between the natural blog condition and control.

Résumé

On retrouve dans le champs de l'éducation une division au niveau de la communication entre chercheurs et praticiens (ou enseignants) (Vanderlinde et al., 2010; Anderman 2011; Cochran-Smith & Lytle, 1990). Les chercheurs trouvent ardu de disséminer efficacement leurs résultats (Chafouleas & Riley-Tilmad 2005; Huberman, 1993), et les praticiens, parmi d'autre difficultés, trouvent la recherche trop compliquée à comprendre, synthétiser et appliquer dans la salle de classe (Vanderlinde, 2010). Grâce à un blog reliant la théorie en éducation avec des activités destinées aux salles de classe, cette étude veut disséminer la recherche aux praticiens dans une forme compréhensible et applicable. Les participants et participantes furent tout d'abord assignés aléatoirement à l'une des 3 conditions possédant des niveaux de communication variés. Le groupe de contrôle eut droit à un site web statique où la communication est à sens unique (les praticiens lisant simplement les textes des chercheurs). Le premier groupe expérimental fut en contact avec un blog standard permettant une communication entre les praticiens ainsi qu'avec les différent chercheurs, tandis que le second groupe expérimental a été soumis à une expérience de blog indirect. Cette dernière condition permettait une communication entre praticiens et chercheurs, mais incluait des commentaires modélisés écrits par des chercheurs se faisant passer pour des praticiens qui détaillaient leurs expériences d'application de recherches en éducation dans une salle de classe fictive. En utilisant des pré-tests et des post-tests afin d'évaluer chez les praticiens le niveau de compréhension du contenu présenté, il a été conclu qu'un plus haut niveau de compréhension était présent chez le groupe confronté aux commentaires modélisés.

Acknowledgements

I would like to extend my sincere thanks to my academic supervisor, Dr. Krista Muis. I am grateful for her support and application of her expertise to strengthen my work.

I would also like to thank Dr. Alain Breuleux for his support and constructive critiques as the external examiner.

Thanks to Philippe Latour for the French translation of the thesis abstract.

Thanks to my peers Tara Tressel, Greg Trevors, Melissa Duffy, and John Rannelluci, for their support, guidance, and many conversations that contributed to this work.

And to the researchers who provided blogs posts for this project, Nikolaus Butz, Kyle Hubbard, Yoon Jeon Kim, Cynthia Paradellis, Sonia Rahimi, Dr. Valerie Shute, Dr. Robert Stupinski, and Tara Tressel.

I would also like to thank my family and friends for their love and support.

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CHAPTER 1

Introduction

"Given the increasing public critique and questioning of our work, I suggest that it is now more important than ever to remind policy makers and practitioners about the salience of our research" (Anderman, 2011, p. 185). Here, Anderman emphasized a need for a stronger communication pathway between researchers and practitioners, including policy makers. This thesis proposes a means of communication to bridge the gap between researchers and practitioners. To accomplish this, I used researchers' resources (e.g., space, data collecting tools, grants, experience), and teachers' knowledge to assess the quality of interventions. Specifically, this research assessed a blog as a communication platform that provides researchers with a system to disseminate their findings to teachers as well as a resource for teachers to connect with researchers and learn how to apply educational theories in the classroom.

My intention was to use social media as a vehicle for communication between researchers and teachers and then evaluate its effectiveness as a communication platform by measuring teacher knowledge through an assessment based on Bloom's Revised Taxonomy (Krathwhol, 2002). Three conditions were developed to assess their effects on teachers' learning outcomes: a control condition wherein teachers were exposed to educational research theories through a static website without social media features, a natural blog condition wherein teachers were exposed to educational research theories through a blog with social media features, and a vicarious experience blog condition wherein teachers were exposed to educational research theories through a blog with social media features and fake comments modeling classroom activities (written by

myself posing as a teacher). For this study, a static website was defined in contrast to the blog conditions. Although the online platforms shared the same content, the static website did not allow for any communication between participants or participants and researchers as it was void of the ability to comment on posts or make suggestions to the researchers through the researcher suggestion box. The researcher suggestion box was a feature available on the blog conditions, in the form of a private comment box, as a pathway of communication straight to the researcher maintaining the blog (myself). The purpose of this study was to compare three learning conditions, one without access to communication or modeling, one with access to communication, and one with access to communication and modeling, to assess their effects on learning outcomes of teachers' content knowledge of educational research.

Contrary to the idea posed by this thesis, many within the educational community believe it is not the role of research to work towards solving classroom problems. Rather, some posit that their role is to further knowledge of educational theories. Vanderlinde and van Braak (2010) suggested two schools of thought: one group of researchers believe that educational research should be used to advance the practice of education, whereas the other is more focused on furthering the field of educational psychology. The former group has focused on how to bridge theory and practice (Bauer & Fisher, 2007; Mortimore, 2000). According to Vanderlinde and van Braak (2010), the group that focuses on bridging theory and practice has two main goals for their research: to further educational research knowledge and to constructively improve education. This group poses that the goal of furthering educational research knowledge is to apply that knowledge in practical settings. Conversely, the latter group of researchers believes that

the relationship between research and practice is not as linear as some suggest. To apply research to practical settings, such as the classroom or in policy, is not a direct transfer of information. Instead, education research should focus on being as valid and reliable as possible and be used to inform those practicing in the field of up-to-date educational theories (Ball, 2001; Bridges, Smeyers, & Smith, 2008; Hammersley, 2003).

Regardless of the group to which researchers subscribe, the gap between research and practice is widely acknowledged in the educational community. Many researchers comment on the lack of available dissemination sources through which their research could to be conveyed to practitioners in the field (Chafouleas & Riley-Tilmad, 2005; Huberman, 1993). The Research Development Diffusion (RDD) model for dissemination was a system proposed to standardize the dissemination of educational research to practitioners. This model is a system of communication that puts knowledge generators, typically researchers, at the center of domain knowledge (Becheikh, Ziam, Idrissi, Castonguay, & Landry, 2013). The researcher therefore shares knowledge with practitioners for educational purposes (Vanderlinde & van Braak, 2010). The RDD model states, "researchers are experts who should transfer their knowledge to educational practice" (Vanderlinde et al., 2010, p. 303). For the purposes of this thesis, the motivation for communicating research is not to assert that researchers are the experts, but to acknowledge that both practitioners and researchers of education are experts in their respective domains. It is important to acknowledge that both parties are working toward the same goal: to further the quality of education for students. To obtain this goal, teachers, practitioners, and researchers must communicate. One potential means by which this communication might occur is through the use of a blog.

Using social media for communication and learning purposes is a rising trend within education (Dabbagh & Kitsantas, 2011). Blogs are being utilized for student and teacher reflection, feedback, and knowledge sharing within the educational practitioner community (Glogoff, 2005; Kim, 2008; Sim, 2010). As such, one mechanism that researchers could use to communicate with teachers is through the use of blogs. Blogs can be used by both parties (teachers and researchers) to participate in the co-creation of knowledge on platforms accessible to everyone in the educational community. Researchers typically disseminate knowledge amongst each other through research journals and conferences, but practitioners often do not have access to such material or the time to synthesize the dense research language. For researchers and practitioners to co-create knowledge, the knowledge of each party needs to be accessible to the other, and being on the same platform may ease that transfer of knowledge. Accordingly, for this study, the blog I developed hosted a variety of social media features to act as a communication platform between teachers and researchers. Through a review of the educational research literature, I will discuss the importance of bridging the communication gap as well as how this was achieved in this study through the use of social media.

Prior to delineating the specific research questions and hypotheses, I first provide a review of the literature. In Chapter 2, I review the literature on the importance of communication between researchers and practitioners and address the literature detailing the features of social media that enhance learning as well as how social media can be used in a learning environment. Vicarious learning in an educational setting from Bandura's social cognitive theory is described, followed by a delineation of how this

approach can be used to improve learning outcomes in the context of social media. Last, Bloom's Revised Taxonomy is detailed as well as how the features social media can be integrated with it to enhance learning. In Chapter 3, I discuss the method by which my study was carried out and delineate the participants as well as the different conditions. I then discuss and interpret the results of the data analysis. Lastly, I address the inferences made from the results as well as the limitations of the study and how the results might be a catalyst for future research.

CHAPTER 2

Overview

The proposed solution to bridge the gap between research and practice is to use a blog with features of social media and modeling from Bandura's social learning theory. Chapter 2 includes a review of the literature that discusses the communication gap between researchers and practitioners within education and how connecting the two communities can help classroom practices. The urgency and importance of closing the communication gap between researchers and practitioners is then delineated. As discussed in more detail in the literature review that follows, there are many researchers who express the necessity of having open communication between teachers and researchers (Anderman, 2011; Cochran- Smith, 1990; De vries & Pieters, 2007; Hallinan, 1996; McIntyre, 2005; Vanderlinde & van Braak, 2010; Zeichner, 1995). A review of the literature that delineates how to bridge the gap follows. The limitations of each suggestion are addressed and taken into account for this study. Due to the proposed solution of a blog as a communication platform, the social media features that foster communication and learning are detailed. Vicarious learning in an educational setting from Bandura's social cognitive theory (1977) is described, followed by a delineation of how this approach can be used to improve learning outcomes in the context of social media. Last, Bloom's Revised Taxonomy is detailed as well as how the features social media can be integrated with it to enhance learning.

How Communication can Help Teachers

The current research dissemination model does not make it easy for practitioners to receive information about educational theories. In particular, teachers are not often exposed to educational research, as they cannot always attend conferences with educational researchers and do not have free access to academic journals. However, the knowledge generated through educational research is often directly beneficial to the classroom. Zeichner (1995) discussed several examples of how research can positively impact a classroom setting. For example, he highlighted Cognitively Guided Instruction in Mathematics (CGI), a program started by Elizabeth Fennema and Tom Carpenter (Fennema, Carpenter, & Franke, 1995) to improve mathematics education. CGI's strategy was twofold: first, it provided teachers with cognitive research on the development of learning math accompanied with minimal requirements as to the classroom application of the research, which gave teachers freedom to teach the material based on how it relates to the students. Second, CGI researchers collaborated with teachers on developing classroom activities based on how they use the research in the classroom. Zeichner (1995) argued that educational policy, teacher education, teacher practices, and especially student learning could benefit greatly from collaboration between practitioners and researchers. While still absent from educational contexts, open and accessible communication between researchers and practitioners is important in the co-creation of knowledge for a sustainable and reliable means of communication to exist.

Identifying the Communication Gap

The first part of the literature review addresses the research that asserts the severity of the communication gap as well as the importance of closing it. Based on

research that has explored the relationship between practitioners and researchers, it is clear that although there is an acknowledgement of the gap, many members of the educational community are not motivated to connect with those outside of their respective domains.

De vries and Pieters (2007) stated that there should be more opportunities for researchers and practitioners to collaborate and reconstruct educational meaning. To address this issue, De vries and Pieters conducted a study that investigated interactions between researchers, practitioners, and intermediaries in an educational conference setting. The idea of this study was to measure the amount of communication between parties when both are given the opportunity to learn directly from one another in person. A total of 490 participants were surveyed; 55.7% were practitioners, 19.2% were intermediaries in education (e.g., policy makers, instructional designers), and 23.1% were researchers (an additional 2% were consumers, who were not included due to lack of representation). De vries and Pieters found that at conferences, 16.8% of researchers surveyed interacted with practitioners and 88.5% interacted with other researchers, and 49.6% of practitioners interacted with researchers and 92.7% interacted with other practitioners. This percentage could be slightly inflated due to the larger practitioner population in the study, however participants were still more likely to interact with their colleagues rather than those outside their group. Conferences are among one of the more efficient means of communicating directly with those outside of one's immediate community, yet these percentages reflect a lack of communication between parties. Based on their findings, De Vries and Pieters suggested using web-based technologies as a means of open and accessible communication between parties.

There is much speculation on why research does not get communicated to practitioners. The dissemination system needs to work on both sides, that is, it must be simple for researchers to share their findings as well as for practitioners to receive them. One major resource that is often underutilized is teachers' voice; much of the research that suggests strategies for integrating theory and practice is based on researchers speculating on teachers' behalf (Cochran-Smith & Lytle, 1990; De Vries & Pieters, 2007; Hallinan, 1996; McIntyre, 2005). One of the first main sources of practitioner information geared toward helping researchers understand the classroom was the *Handbook of Research on Teaching* written by Merlin C. Wittrock in 1985. According to Cochran-Smith and Lytle (1990), this handbook was seen as the "most comprehensive" guide to deepen understandings of the intersections of teaching and educational research. However, as Cochran-Smith and Lytle criticized, Wittrock, a researcher, failed to include teachers' perspectives. That is, his research was based on observations of teachers by researchers.

Vanderlinde and van Braak (2010) investigated why practitioners often do not seek out educational research through directly communicating with practitioners. To explore why there are barriers between teachers and researchers, Vanderlinde and van Braak conducted a study that asked teachers to describe the difficulties of implementing research into the classroom. Using four focus groups, each comprised of teachers, educational researchers, school leaders, and intermediaries, Vanderlinde and van Braak facilitated discussions on selected topics within education. A questionnaire was sent to education research professors regarding the gap between research and practice as well as how researchers typically disseminate their results. Analysis of responses revealed four

main barriers: (1) practitioners find a lack of applicability for research in the classroom; (2) research is too ambiguous and indirectly related to practical classroom problems; (3) researchers use complex, technical research language to communicate with each other that it is not translatable to the rest of the educational community; and (4) teachers are not yet convinced that applying research in the classroom will improve their teaching practice.

These barriers prevent practitioners from seeking out educational research on many levels. First, if research is not seen as a useful tool for enhancing classroom practices, it will not be sought out or used. Second, even if it is seen as useful, if research is not made to be readily available and understandable for practitioners it will not be used. Breaking through these barriers would require a reliable system of communication that provides research solutions to practical classroom problems in colloquial language to allow those within educational communities, including teachers, administrators, and policy makers, to participate in problem solving and policy change. Given these issues, several researchers have made recommendations for bridging the communication gap, which are delineated in the next section.

Additionally, Anderman (2011) argued that it is the responsibility of researchers to communicate their results to the practicing community. He explained that research is not accessible to teachers, policy makers, and students. This is a problem within the field of education because we have "developed a bountiful body of knowledge about how individuals learn, and how school contexts can be organized to facility learning" (Anderman, 2011, p. 185), however the body of knowledge is not being applied. Anderman hypothesized that the research language used might prevent practitioners from

taking the time to find, synthesize, and implement it into their work and that even if they had the access and time, practitioners might not find the research relevant to their practice, two issues that were also stated in Vanderlinde and van Braak (2010). Anderman proposed 10 strategies for researchers to disseminate their research into practitioner communities, three of which include: (1) writing an applied article for a practitioner-oriented journal, (2) working collaboratively with teacher educators, and (3) talking about one's research conversationally with others in person and via social media. Although Anderman holds researchers responsible for integrating research with practice, I propose that through a combination of solutions, it is the responsibility of all agents within the educational community to engage in communication.

Suggestions for Bridging the Gap

This section of the literature review addresses recommendations for bridging the communication gap. The following research makes it apparent that many researchers understand this gap to be a severe issue, but are unsure exactly how to create a platform for easy and consistent communication. Each of the suggestions reviewed have limitations that prevent effective bridging of the gap, which have been taken into account in the discussion.

Teacher research, defined as, "intentional inquiry carried out by teachers" (Cochran-Smith and Lytle, 1990, p. 2), is the first suggestion reviewed. It is a commonly suggested solution for bridging the communication gap and integrating research with practice. Contrasted with typical lab-setting research, teacher research falls under the category of action research, defined by Lewin (1948) as "comparative research on the conditions and effects of various forms of social action and researching leading to social

action" (p. 202-203). Literature produced from teacher research is often published in teacher journals and circulates mainly through the practitioner community. According to Zeichner (1995), although results that stem from action research are valid resources, they have often not been well received or taken seriously enough by the academic research community. In fact, the gap between researchers and practitioners is enhanced when comparing teacher research with research conducted through academia. Teachers often feel as though research conducted in academia does not directly apply in the classroom, and research conducted by practitioners is rarely cited or even acknowledged in academia (Zeichner, 1995).

Therefore, the following assumptions can be made based on problems that arise when relying on teacher research to integrate theory and practice: (1) teacher research involves either the teacher executing research in their classroom or researchers changing their current strategies for the development and execution of research; (2) results are circulated among the practitioner community instead of the whole educational community; and (3) even if results were easily available for educational researchers, they are not viewed as reliable or valid due to the uncontrolled classroom setting and untrained researcher (teacher). In addition, teacher research, although a rich source of information, does not occur frequently enough for the educational community to depend on it as a source to integrate theory with practice and, as such, alone will not serve as the vehicle of communication between researchers and practitioners.

A second suggestion by McIntyre (2005) addressed the reasons for the existence of this gap between research and practice. For one, the types of knowledge used by researchers and teachers are different. Researchers are responsible for fostering

pedagogical knowledge, that is, knowledge of how to enhance student learning. The knowledge shared among researchers is not necessarily applicable in an authentic setting; McIntyre emphasized the necessary generalizability of research knowledge, whereas for teachers, their knowledge must be contextual. This contextual knowledge shared among practitioners is described as *practical knowledge*; it must be practically applicable in a specific educational context and is fostered by practitioners who are problem solving in authentic settings on a constant basis. His suggestion was to reconstruct a new kind of knowledge, one that meets in the middle between theory and practice, through open dialogue between researchers and teachers. This can be done by transforming teachers' schemas developed from classroom experience into constructed, sharable knowledge. McIntyre's intention to harness teachers' knowledge for researchers is ideal if the dialogue can be executed and disseminated properly and often enough. It would require a constant, reliable avenue of communication where teachers and researchers integrate their knowledge to construct solutions to common classroom problems.

In contrast to the first two recommendations, Hallinan (1996) proposed to integrate a specific person employed at each school to serve as the physical connection between research and practice. This person ideally has both teaching and research experience to consider the needs and knowledge base of each party. This person should also have the ability to properly identify the important concepts within research and synthesize it for easy sharing and application, while understanding the constraints of the school budget. This, however, is not an option for every school. Many schools do not have the budget or space to hire an additional person specifically for this one duty.

Schools, teachers, and researchers require a free resource that will provide the same service.

Summary

The research surveyed thus far has identified the communication gap and has provided suggestions for integrating theory with practice. The ideas of teacher research, facilitating a discussion to restructure teacher and research knowledge, and employing a person to act as the liaison between schools and academia were explored. These research-based suggestions have advantages and disadvantages, however each is missing a specific piece for success in closing the gap. Specifically, (1) the teacher research suggested by Cochran-Smith and Lytle (1990) is missing the accessibility of the experts (researchers), the time available to teachers to dedicate to research, as well as a dissemination system of teacher research literature to researchers, (2) the new set of knowledge that combines teacher and researcher knowledge suggested by McIntyre (2005) necessitates an easily accessible dissemination platform shared between researchers and practitioners, and (3) hiring a new employee, as suggested by Hallinan (1996), may not be financially feasible in every school, and therefore would not be consistent across the educational practitioner community. The next attempt of integrating research and practice needs to keep in mind all of the above missing components from previously suggested approaches as well as invite practitioners to engage in a feasible solution for both communities. A proposed solution is presented next.

Solution to Bridging the Gap: A Blog

Based on the suggestions of closing the communication gap and the barriers posed by Vanderlinde and van Braak (2010), we can assume two main problems, one arising from each community. First, researchers' main difficulty is the process of dissemination to practitioners; second, practitioners' main problem is access to the research as well as the ability or time necessary to synthesize it for classroom application. Taking into account the suggestions made by Anderman (2011), the barriers posed by Vanderlinde and van Braak (2010) based on responses from teacher discussions, and the previous attempts of integrating research and practice, the proposed solution for this research was a blog that pairs educational theories with classroom activities.

Addressing the missing components from previous attempts to integrate theory and practice. A blog may be one vehicle through which teachers and researchers can effectively communicate. First, blogs reduce the amount of work carried out by teacher research and increase the reliability of results (Cochran-Smith & Lytle, 1990) by providing the opportunity for an open and accessible platform for communication where teachers and researchers can share their respective experiences. Second, McIntyre (2005) suggested starting a dialogue between researchers and teachers to reconstruct both parties' respective domain knowledge and form a newly shared set of ideas. A blog offers a practical application of McIntyre's suggestion as a platform that provides a constant and reliable pathway of communication between parties involved in the conversation and an evolving body of knowledge to share. Finally, Hallinan (1996) suggested hiring an employee to act as the connection between research and practice. This person ideally understands teachers' classroom problems as well as what is available and feasible in

research while respecting the restrictions of the school budget. Through the use of social media features, a blog offers a free, easily accessible, and comprehensible alternative and provides a means by which a direct connection between research and practice can occur.

Addressing the barriers. As Vanderlinde and van Braak (2010) identified, there are four barriers of communication between teachers and researchers: (1) practitioners find a lack of applicability for research in the classroom; (2) research is too ambiguous and indirectly related to practical classroom problems; (3) researchers use complex and technical research language that it is not translatable to the rest of the educational community; and (4) teachers are not yet convinced that applying research in the classroom will improve their teaching practice.

To address these issues, each post on the blog used for this study had two components, an educational theory and a classroom activity that applies the theory. This provided practitioners with the ability to directly apply the research to their teaching, consequently reducing ambiguity and putting context to the research. Each post was written by a researcher who translated technical research jargon into an understandable explanation for anyone in the educational community to comprehend. Moreover, the features of a blog that can promote socializing and engagement (as explained in further detail below) allowed opportunities for direct communication between researchers and practitioners. This provided an opportunity for dialogue between teachers and researchers and a place where teachers could suggest research based on what is needed in the classroom and a place where researchers could disseminate their results.

A blog also addresses some of the recommendations made by Anderman (2011). Specifically, although a blog is not an accredited journal, it provides a platform for

researchers to disseminate their results directly to practitioners and vice versa. Blogs also provide a platform for open and accessible communication allowing for real-time, online collaboration and bilateral communication. Finally, a blog is a platform that provides social media features that allow for building networks of resources to share with parties within the educational community. The following will address the definition and features of social media.

Definition of social media

Using a blog as a social media site to integrate theory and practice allows for accessible communication, knowledge sharing and reconstructing, as well as engagement from a variety of experts. According to Dabbagh and Kitsantas (2011), the term *social media* has been used to describe a network of tools and technologies that can be used for communication, collaboration, and creative expression. Taking on many different forms, such as blogs, microblogs, forums, or wikis, social media is the result of user-generated content and user engagement in the collaboration of content (Pikalek, 2010). Social media is becoming increasingly prevalent in educational settings, the amount of students' social media use is increasing, and the age gap between those using it and those not is continually shrinking (Dabbagh & Kitsantas 2011). In addition, social media is proving to be a useful tool for teaching, self-directed learning, and communication (Dabbagh & Kitsantas 2011).

There are many different types of social media sites. According to Dabbagh and Kitsantas (2011), they can be categorized as experience- and resource-sharing (as in the case of this research), wiki software, media sharing, and social networking sites, as well as web-based tools. The purpose of the social media tools are to share photos, videos, and

knowledge; to deconstruct and reconstruct knowledge; and to expand networks of people and knowledge based on interests. Specific features of social media sites, detailed next, allow users to identify relevant information, discuss that information, and then share it.

Features of Social Media

The features of social media detailed below allow users to easily identify, share, and reconstruct the information. These features facilitate discussions, knowledge construction, and sharing. Learners can use social media as a tool for self-directed learning, publicly provided constructive feedback, personal reflections, and motivation for knowledge generation.

Social bookmarking. Social bookmarking is a way for social media users to identify and share resources. It is a platform that allows users to publicly mark and share pieces of information, from different sites, relevant to their interests or goals. Examples of social bookmarking platforms are Pinterest and Delicious, which allow users to connect with each other and view each other's marked items of interest. Someone might use social bookmarking to categorize their favorite educational technology blogs, the academic journals they read, or even recipes. This sharing exposes users to a variety of ideas and connects knowledge together that might otherwise remain separate. In this way, social bookmarking has the potential to facilitate knowledge construction. This can be used in an academic setting where learners are connected with each other and "bookmark" or categorize, share, and connect research resources for a group project (Dabbagh & Kitsantas, 2011).

RSS System. An RSS system is a storage platform that categorizes users' set of online resources they follow. It facilitates easy knowledge construction and sharing by

allowing users to identify sites relevant to their interests, store them on one platform, and receive updates from each in one location. According to Kang, Bonk, and Kim (2011) "RSS systems help expert bloggers and more casual learners receive updated information automatically without the need to always visit other blogs" (p. 228). By organizing their RSS feeds into categories based on interests, goals, or authors, users can more efficiently keep up with multiple online resources and have quick and easy access to resources in one place. Kang et al. (2011) demonstrated two pedagogical advantages of RSS systems: (1) it builds a community of practice, which allows for layers of connectivity between sites, opportunities for proactive communication among bloggers, and an easy system to monitor information updates; and, (2) it provides a space for allocation of learning resources and knowledge constructed among users.

Trackbacking. Trackbacking, a specific feature of blogs that facilitates sharing and knowledge construction, allows users to link one blog to another while notifying the writer of the original blog that the link was shared. This linking tool allows the user to repost an article while automatically linking it back to the original, alerts the writer of the original article that their link was shared, and posts a comment on the original blog that links to the shared post. Kang et al. (2011) expressed that trackbacking is an efficient technique to form a community of users interested in similar content. From the links to the original post, trackbacking allows for easy sharing between blogs and, as such, allows users to build and link individuals or communities of interest. The comments automatically posted on the original writer's behalf facilitate knowledge construction. For example, an individual may read a comment on the original blog and make a connection between two ideas they would not have necessarily made independently.

Comments. Efimova and Moor (2005) defined comments as a feature that allows users to engage in conversation about a particular blog entry; they are one of the defining features of a blog that separate it from a static website. Through the comment boxes on the site, users can have discussions on the posed ideas. The comments on a blog are a vital part of the site that allows readers to communicate with each other and the writer. According to Kang et al. (2011), comments facilitate resource sharing and linking, knowledge construction and clarification, as well as community building. Each user who makes a comment contributes to the multiple voices that are part of the blog; as a result, a community is created with a variety of perspectives (Kang et al., 2011). According to Glogoff (2005), comments can be used for public peer-to-peer feedback and as a record of knowledge generation that can be used to reflect upon the process of constructing new ideas. . Glogoff asserted that providing public feedback teaches students how to be more constructive rather than critical in their feedback.

Tagging. Tagging, through which key words and concepts that are a reflection of the scope of the blog are identified, facilitates quick searchable terms and provides users with perspectives of the themes discussed on the site. If a user is browsing and not necessarily looking for a specific term they can use the linkable tag cloud, typically on the main page of a blog, to provide a visual representation of the site themes and common key terms used. The linking capability of the tag cloud sends users directly to the posts with the respective tags. According to Kang (2011), tagging, like commenting and RSS systems, is an easy way to link posts together, share knowledge, and monitor blog activity.

The different features of social media sites allow users to easily identify, aggregate, organize, and share resources. RSS systems, tagging, and social book marking allow users to quickly access resources, while trackbacking and commenting facilitate the aggregation and sharing of these resources (Kang et al., 2011). According to Kang et al., sharing resources can lead to dialogue and knowledge construction. Once information is aggregated, it is easier for readers to combine and share information. The knowledge generated through combining the previously aggregated information is a combination of the reader's knowledge with those who have also shared or commented on the pieces of information online.

Learning Through Social Media

The use of social media in educational settings is steadily increasing, and students are beginning to integrate social media with their academic education (Dabbagh & Kitsantas, 2011). Many educators have taken to using blogs as a venue for student reflection as well as peer feedback (Glogoff, 2005). The features mentioned above allow users to identify relevant information, share that information, and construct new information based on discussions that occur between individuals using the blogs. The following section of this literature review will address the different ways social media can facilitate learning.

Self-directed learning. Wodzicki, Schwämmlein, and Moskaliuk (2102) stated that social media has two advantages for learners: it allows learners to manipulate their learning environment and actively engage in the learning process. According to these authors, these factors might enable a self-directed learning environment. Loyens, Magda, and Rikers (2008) defined self-directed learning as the learner being responsible for the

following components of their learning: setting learning goals, identifying and addressing knowledge gaps, identifying resources for pursuing learning goals, selecting and pursuing specific learning strategies, and evaluating the learning outcomes. Dabbagh and Kitsantas (2011) argued that the benefits of learning through social media include, first, the promotion of independent exploration based on interest and curiosity and, second, an understanding that there are multiple sources knowledge, both of which consequently empower learners to take charge of their learning.

According to Dabbagh and Kitsantas (2011), this exploration of resources will often lead to the development of a personal learning network (PLE). A PLE, or collection of a reader's information, allows readers to house and organize their aggregated information through features of social media, especially tagging and RSS systems. Dabbagh and Kitsantas defined a PLE as a cloud-based set of tools that has been aggregated through social media by the learner, enabling them to create, organize, and share the information. In addition, PLEs have been listed in the 2011 Horizon Report as one of the most impactful emerging technology on the learning environment. Dabbagh and Kitsantas further suggested that the previously discussed features of social media combine to assist learners in aggregating, sharing resources, and generating knowledge, and may scaffold a deeper learning process. Learning through social media, which is facilitated by learners' particular interests or curiosity when they take an active role in their learning, is inherently self-directed (Dabbagh & Kitsantas 2011; Wodzicki et al., 2012; Glogoff, 2005, 2003).

Guided discovery. Glogoff (2005) defined guided discovery as a method of learning that can occur in formal or informal learning settings that provides students with

an opportunity to further explore interesting topics independently with scaffolding from the instructor or the learning environment. Furthermore, it is a process that is enabled through scaffolding provided by resources available online. Aggregating resources online sometimes necessitates scaffolding from a teacher to facilitate proper resource use., In an online learning environment, guided discovery can be scaffolded by other participants in the same online learning network; it can facilitate collaboration and knowledge building between readers and writers through the communication features of social media. These features also allow readers to problem solve through different resources as well as communicate with a variety of experts.

Collective creation of knowledge. According to Tang and Lam (2012), the collective creation of knowledge relies on individual engagement with the social media site as well as with each other. Due to the public and dynamic nature of social media sites, this process of knowledge construction is ongoing and evolving. From this, we can see that knowledge is collectively created through those who are following specific social media sites and engaging in the discussions to advance knowledge. Through social media, online learning now involves interactions as learners link information and communicate that information on many different platforms. According to Kang et al. (2011), the variety of platforms provided through the features of social media gives learners an opportunity to be actively engaged in multiple learning communities, constructing new knowledge on each. The above features, specifically through providing platforms for commenting and sharing, provide opportunities for readers to discuss their thoughts on a topic, while bringing in resources that may alter the understanding of the information that was originally posted.

Robertson (2011) conducted a study investigating the learning outcomes of 113 students who each maintained a blog for one of their courses. The learning outcomes were viewed through the scope of their participation in self-directed learning measured through the content on each student's blog posts. The quantitative analysis used word count, mean word count, and total posts. This analysis was a measure of the effort students put into maintaining their blog and ultimately the effort put into their learning in the particular course. The blog posts were then coded for instances of self-directed learning, emotional expression, and social support. The results were broken up into three categories, focused on the three constructs listed above, through the lens of students' participating in blogging in three ways: *posting*, *reading*, and *commenting*. For the sake of this study, I focused on *reading* and *commenting,* which is what teachers were asked to do for the online platforms provided. The results showed instances of self-directed learning in both reading and commenting using skills such as, *supports peers*, *seeks help from peers*, and *learns domain specific skills* (Robertson, 2011).

In summary, social media provides a variety of methods to enhance learning. It allows learners to explore independently, scaffolded by their environment or instructor, and pursue their curiosity by using the available resources. Given these features, educational environments have been moving to online platforms (Kang et al., 2011), incorporating cloud-based learning management systems (LMS) such as Blackboard and myCourses. Although research has been conducted to explore the effects of these online environments on learning (Dabbagh & Kitsantas 2011; Kang, 2011; Glogoff, 2005; Woodzicki, 2012), much work is yet to be done with regard to how to structure these environments to foster better learning outcomes. Modeling, an effective in-person

approach to improving learning outcomes (Jay, 2002) has yet to be explored online. Modeling is part of social learning theory (Bandura, 1977) and, more recently, social cognitive theory (Schunk, 2012).

Social Cognitive Theory

Social cognitive theory has two major emphases: first, that learners actively engage with the material and are active agents in their learning; and, second, that learners actively engage with each other and learn from their social interactions (Schunk, 2012). Originally stemming from Albert Bandura's social learning theory, social cognitive theory shifts the main focus from behavioral processes to cognitive processes and places heavy emphasis on the distinction between learning and performance.

According to social cognitive theory, many learning experiences occur vicariously through observational learning or enactively through pursuing a task (Bandura, 1978). Schunk (2012) described enactive learning as an instance where the learning occurs as the learner pursues the task through reinforcement. Learners have a tendency to retain behaviors that result in success and modify or discard unsuccessful behaviors. This has many benefits for learning, such as learning behaviors that lead to positive consequences and ignoring behaviors that produce undesirable consequences; however, it reduces the breadth of learning that might occur.

When learners pursue a vicariously learning task, they have more time and opportunities to learn a variety of skills and knowledge. For learning to occur vicariously, Skinner (1953) proposed that the following process must occur: the discriminative stimulus (the observed action) must be followed by the response (the learner's imitation) and then the reinforcing stimulus (a stimulus reinforcing proper

imitation from the learner). According to Bandura (1977), models for vicarious learning come in all forms, physical, pictorial, or written. Schunk and Hanson (1989) emphasized that the more the learner relates to the model, the stronger the transmittable efficacy, which is a predictor of performance. Along with the processes posed by Skinner, Bandura (1977) asserted four factors necessary for vicarious learning to occur: observers must be motivated to act, they must be provided with an example of the desired behavior, they must match the example in their performance, and their imitative behavior must be positively reinforced. Similar to enactive learning, learners engaging in vicarious learning experiences tend to retain information or behaviors that are associated with success and discard those that are unsuccessful.

Beyond the ability to fit more learning into the same amount of time, Schunk (2012) asserted many other benefits to observational learning. The process of learning vicariously can allow for more complex learning processes to occur; learners observe the models' lessons (physically, verbally, pictorially, or in written form), practice the behaviors, and receive feedback from the model. Also, enactive learning requires the learner to have the physical ability to perform the behavior immediately as they are learning it; this may not always be the case, and the reinforcement must be present for the learning to occur. For the case of observational learning, also known as modeling, it can be learned without the presence of reinforcement stimuli.

Learning in the absence of reinforcement stimuli, according to social cognitive theory, is considered to be latent learning (Schunk, 2012). Latent learning is an aspect of social cognitive theory that sets it apart from social learning theory. It asserts that while people can learn through experience without reinforcement, they tend to not perform in

such instances. In contrast, learning with reinforcement tends to result in high performance outcomes. An example of the difference between learning with and without reinforcement is shown through a classic experiment done by Tolman and Honzik (1930). They had two groups of rats with 10 trials of running through a maze. One of the groups of rats was fed upon finishing the maze and the second group was not; those who were fed began to make fewer mistakes and have a faster time as the trials increased. After the ten trials were over, half of the rats in the non-reinforced group were fed upon completing the maze, resulting in a decrease in time and errors (Tolman & Honzik, 1930, as cited in Schunk, 2012). From this, social cognitive theory makes a clear distinction between performance and learning.

Modeling as "Teaching by Example." In a study done by Jay (2002), teacher education was investigated through the lens of modeling, referred to as "teaching by example." Modeling is an especially important technique for teacher education through which a lecturer instructs teaching strategies that teachers may not have encountered as learners themselves. Modeling therefore allows preservice teachers to experience the complex teaching methods they will use in the classroom. Jay (2002) explored modeling as a technique for English teacher education by asking questions such as, "How do students respond to modeling as a way of learning to teach?" and "What issues, challenges, and concerns surround the use of modeling as a pedagogy?" In Jay's study, instructional scaffolding was used as the complex teaching method that was modeled in teacher education. Jay examined two classes of English teacher education. One class of preservice teachers used instructional scaffolding (explicit physical modeling condition) and the second was taught about instructional scaffolding with the intention of eventually

using it (implicit written modeling condition). This was a qualitative study that looked at students' and professors' reactions to the lessons through observation, interview, and lesson plans turned in by the students after the lesson. Jay found that, although learning occurred in both conditions, the students in the explicit modeling condition could better articulate instructional scaffolding.

Modeling in a computer-based learning environment. A study done by Honebein, Carr, and Duffy (1993) used modeling in a computer-based learning environment to enhance learner performance. Honebein et al. were investigating how modeling in a computer-based learning environment, using the game *Where in Time is Carmen San Diego*, may enhance learning and problem-solving skills using three conditions: expert model, novice, or no model. The expert group provided modeling of an expert using the game; the novice group used modeling of a novice using the game; and the control group did not us any form of modeling. The modeling was in the form of a video that participants watched prior to playing the game; the expert video emphasized the perfect path to the solution, whereas the novice emphasized true novice performance (i.e., making common mistakes a novice makes). Forty-five undergraduate and continuing education students were randomly assigned into each of the three conditions and participated with course credits as an incentive. The results of the study showed significant difference in participants' problem-solving abilities in the modeling versus control conditions but no significant difference between the expert and novice conditions.

From the above literature we can assume that teaching through modeling enhances performance (Honebein et al., 1993; Jay, 2002; Schunk, 1989, 2012). The necessary factors involved for modeling to be rich are twofold. First, learners must be

motivated to perform the task and must perform the task, an example of the task must be provided, and their performance must eventually be positively reinforced (Bandura, 1977). Second, models must be similar to the learner to help the learner relate to the model (e.g., peer) (Schunk, 1989). Modeling can occur through direct experience, observation, or implicitly (Bandura, 1977; Jay, 2002). Bandura (1977) furthered this idea by asserting that modeling can be conveyed physically, verbally, or through pictures. As education moves further towards online platforms, it is important to explore the effectiveness of online modeling based on academic outcomes. Implicit modeling via written communication about how to carry out a task has been accepted as a possible method for enhancing learning (Bandura, 1977; Jay, 2002). For the purposes of this research, modeling was achieved by writing preset comments on five out of eight blog posts. The preset comments were written as fictional teachers detailing how they applied the suggested classroom activity from the specific blog post into their classroom.

Bloom's Taxonomy

Implicit, written, modeling has been accepted as a possible method of enhancing learning (Bandura, 1971; Kay, 2002). Social media provides possible platforms for users to detail their experiences and, in the case of this study, their use of tools in the classroom; this detailed explanation acts as a written model. To capture learning through a blog that has features of communication and written modeling, this study measured both declarative and practical educational research knowledge of teachers before and after exposure to the blog. An assessment was designed using the framework provided by Bloom's revised taxonomy of knowledge.

Originally developed by Benjamin S. Bloom in 1949, Bloom's Taxonomy was used as a framework for developing and sharing a classification system of educational concepts (Krathwohl, 2002). This framework was originally created to standardize educational concepts and practices across schools. Those within the educational community used it to communicate issues of common classroom practices, often in terms of student assessments. According to Krathwohl (2002), Bloom viewed the taxonomy as more than just a framework for assessing, evaluating, or classifying knowledge. It was also a: (1) common language that educators across disciplines and grade levels could use to communicate; (2) standard for creating curriculum goals and standards; (3) foundation to help create system-wide educational goals and "objectives, activities, and assessments in a unit, course or curriculum" (Krathwohl, 2002, p. 212); and, (4) standard through which educators can compare the breadth and depth of curriculum and courses against each other. The framework was broken down into the following six major categories listed in order from simple to complex cognitive processing: *knowledge*, *comprehension*, *application*, *analysis*, *synthesis*, and *evaluation*. Each category except application was further broken down into subcategories. The breadth of the knowledge categories of this taxonomy has aided education by allowing the community to understand where and how frequently assessment items, among other educational tools, fall on the spectrum of cognitive processing.

Bloom's Taxonomy acts as a shared framework among educators and those within the educational community. Revisited and revised, one can assume this taxonomy is a reliable foundation upon which to base knowledge growth. The system of hierarchical cognitive processes in this framework can be used to analyze the learning

processes occurring through social media. To explain, the features of social media that facilitate learning range from shallow to deep cognitive processing. By referring back to features of social media, social booking, tagging, and RSS systems aid users in identifying important information, which requires the basic terminology of a domain or the most shallow cognitive process referred to as *remembering*, according to Bloom's Taxonomy. However, as users gets more involved in the material, they can link resources that would not necessarily be linked otherwise, referred to as *understanding* in Bloom's Taxonomy, a cognitive process that is more complex than *remembering*. Lastly, as users communicate with each other via comments and discussion forums, new knowledge is constructed through the input of multiple perspectives. This is *analyzing* in Bloom's Taxonomy, and is considered a deep cognitive process.

The Current Study

There is a clear gap in the online learning literature with regards to using in-person teaching methods, specifically modeling, online. To advance the literature on social learning theory integrated with online learning, this study addresses the necessity of enhancing the online learning experience. The research questions were: (1) Does exposure to a learning community that pairs educational research theories with classroom activities and provides opportunities to socialize increase teachers' levels of educational research knowledge when compared to the same learning community without features of communication? (2) Does exposure to an online learning community that implicitly models research-based classroom activities through writing influence teachers' levels of educational research knowledge? Based on Bandura's social learning theory, I hypothesized that teachers in both the natural blog condition and the vicarious experience

blog condition would learn more over time through the use of social media features that foster communication and knowledge generation compared to teachers in the control condition, and that teachers in the vicarious learning condition (via modeling) would learn more than teachers in the natural blog condition (no modeling).

This study examined the possible effects that features of communication and implicit modeling have on educational research knowledge specifically for teachers. The content was educational theories, delivered on a web platform paired with applicable classroom activities. The three conditions allowed me to compare three levels of features believed to enhance learning. The control condition, a static website, strictly provided content without features of communication or modeling. The natural blog condition went one step further, providing the same content with the addition of communication features embedded (e.g., comment boxes, researcher suggestion box). Lastly, the vicarious experience blog condition had the same content and provided features of communication as well as implicit modeling of suggested classroom activities. The effectiveness of the communication and implicit modeling features were measured with an education research assessment written based on the content shared on the web platform.

CHAPTER 3

Methodology

Participants in this study were collected over a period of four months from various locations in North America. They were randomly assigned to one of three online learning conditions that communicated educational research with a set of features that depended on the condition (see below). Their learning was evaluated by a pre- and post-assessment written specifically for this study based on Bloom's Revised Taxonomy.

Participants

The participating population was defined as actively working kindergarten through grade 12 teachers. Participants were recruited in the fall of 2013 from Canada and the United States. Through convenience sampling, teachers were recruited using Twitter, Facebook, and in-person recruitment at two conferences in Toronto (Solution Tree on October 15-17, 2013 and Mindshare Learning on November 5, 2013). Teachers within personal networks were also contacted via Facebook and email. The participants were added to a lottery to win a $150 Visa gift card. Initially, 100 teachers volunteered to participate and completed the pretest, but only a small portion of this number completed the posttest. Specifically, 35 K-12 teachers from the United States and Canada completed all online aspects of the study (N = 6 teachers in the United States, 28 teachers in Canada, and 1 teacher in Thailand). The age range of the sample was 25-44 with 37.5% between 25-34, 41.7% between 35-44, 12.5% between 45-54, and 8.3% between 55-56. The range of years of teaching was 1-25, with 12.5% teaching from 1-5 years, 41.7% between 6-10 years, 20.8% between 11-15, 16.7% between 16-20, and 8.3% between 21-25 years.

Participants represented teachers from a variety of disciplines and grade levels (N = 12 primary school teachers, 22 secondary school teachers, and 1 K-12 teacher). There was no significant difference among participants coming from different domains, as described in the results (see below).

Materials

Demographics. A demographics questionnaire was included as part of the survey to collect relevant information about the sample. Teachers were asked general questions about their age, gender, and occupation location as well as: the grade level they teach, length of time teaching, and primary subject of instruction. Teachers were also asked about their average blog use, including reasons for visiting blogs, frequency of visiting blogs, as well as experience building blogs (refer to appendix A for full demographics questionnaire).

Prior knowledge assessment. Using Bloom's Revised Taxonomy, I created a pretest to measure participants' prior knowledge of education research. There were two questions for each of the eight blog posts (one content question and one application question) for a total of 16 questions. Questions addressed basic content knowledge covered in the blogs as well as how to apply that content to classroom situations. A panel of five educational research content experts and a survey development expert reviewed the items.

Intervention. The online platform intervention included three groups: vicarious experience blog, natural blog, and control. All three conditions presented the same research information paired with a classroom activity. Participants in the control group were exposed to a static website where they did not have direct access to each other or

the researchers. Both the vicarious experience and the natural blog conditions provided features of social media through which participants could communicate with each other and the researchers. Participants in the vicarious experience condition were exposed to a blog with preset comments written by the researchers on five out of eight blog posts. The preset comments were written as fictional teachers modeling how they applied the classroom activity in their classroom. Participants in the natural blog condition were exposed to a naturally forming learning community without preset comments. The previously mentioned features of social media included a space for comments on each blog post, an icon to "like" or "dislike" each post, as well as a link to "recent comments" made by other participants. Each post addressed a theory in educational psychology based on themes of innovations in the science of assessment, emotional engagement and disengagement, as well as cognitively and socially guided learning. Each theory was paired with a classroom activity, ranging from K-12, that allowed teachers to directly apply the theory in their lessons. Participants were asked to read the posts that interested them and pertained to their classroom.

Posttest. The first set of questions on the posttest asked participants about their experience reading the material on the online platform (see Appendix B). These questions were regarding the format, content, and relevance of the posts to determine whether a blog was a proper vehicle of communication between teachers and researchers. The second instrument was a posttest that assessed teachers' learning after being exposed to the online platform. The posttest was in two parts, the first was a set of multiple-choice content knowledge questions (one question for each blog post) and the second was a set of word problems with application and evaluation questions (see Appendix C).

There was one application and one evaluation question for each blog post and teachers were expected to apply educational theories to common classroom problems. All questions, content knowledge, application, and evaluation were based on Bloom's Revised Taxonomy.

Procedure

Participants were randomly assigned to one of the three conditions. Each online platform remained private for the duration of the study and required a username and password (randomly generated by the researcher to maintain participant anonymity) to prevent participants from exposure to other conditions. All groups began the study by taking a pretest through SurveyMonkey to collect demographic information as well as to measure their baseline education research knowledge. Upon starting the study, the teachers in the experimental group were given access to a research-based blog, which included all eight blog posts. The participants in the control group had access to a static website with the same information as the blog, without the presence of the interactive learning community. They were also asked to attempt an implementation of at least one suggested classroom activity, with the goal of having teachers apply the research theories directly in the classroom. Once participants attempted to implement one of the suggested classroom activities, they were asked to take the posttest. The posttest was designed to measure their educational research knowledge after being exposed to the online platform.

CHAPTER 4

Results

Preliminary analyses. First, given that the sample size was smaller than expected, this must be taken into account when interpreting the results. Preliminary analyses revealed that the skewness and kurtosis both fell within the normal range for both the pretest and posttest scores. Skewness ranged between -1.59 to -0.87 and kurtosis ranged between -0.51 to 0.26. A one-way analysis of variance (ANOVA) was run with the learning conditions as the independent variable and total pretest scores as the dependent variable, to measure possible differences in prior knowledge between the three conditions. This resulted in no significant difference between pretest means between groups (Table 1).

To investigate the effect of condition on posttest scores, an analysis of covariance (ANCOVA) was carried out with the learning conditions as the independent variable and learning outcomes (posttest score) as the dependent variable. Participants' prior knowledge (pretest score) was included as the covariate. Descriptive statistics of posttest scores in relation to learning condition are presented in Table 2.

Table 1: *Descriptive Statistics for Participant Pretest Scores in Relation to Their Assigned Condition*

Participant Assigned Condition	Mean	Standard Deviation	Sample Size
Control	8.21	2.42	14
Vicarious Experience	9.83	2.12	9
Natural Blog	9.33	2.64	12
Total	9.06	2.71	35

Table 2: *Descriptive Statistics for Participant Posttest Scores in Relation to Their Assigned Condition*

Participant Assigned Condition	Mean	Standard Deviation	Sample Size
Control	14.93	4.01	14
Vicarious Experience	17.78	2.49	9
Natural Blog	14.42	3.60	12
Total	15.49	3.71	35

Open ended responses and comments. With social media features, the natural blog and vicarious experience conditions allowed teachers to comment on individual blog entries. The natural blog condition had 7 total teacher comments by 2 different participants (17% of the sample), whereas the vicarious condition had 5 total comments from 3 participants (33% of the sample).

The posttest finished with “Do you have any other comments or feedback you are interested in sharing regarding this experience?” which allowed teachers to share their experience with their assigned learning condition. Of the 35 participants, 11 provided feedback. Teachers’ comments ranged from encouraging to raising questions and concerns. Encouraging feedback included statements such as “Good luck,” “I really enjoyed learning from your website,” “Continue with your research,” “These are important topics in education.” “I really (app)laud your effort to make more connection between academia and teaching practice. I think it is vital that the fruits of your research trickle down to those of us in practice.”

Concerns that teachers expressed were centered on lack of resources and time. Examples included the following; “One of the main drawbacks to incorporating these technological ideas into my classroom is access to effective internet, bandwidth, computers and technological tools as a whole,” “As a relatively new math teacher, I'm sorry I wasn't able to incorporate more of the research into my teaching (there just seem to be so many things to keep track of and so many curriculum demands, and I want to stay in line with the other teachers,” “Teachers have absolutely NO prep time to be able to construct, defend, and implement…” and “Well done on the time element - teaching took priority when I realized the amount of reading. December break let me peruse the site, and having a week back in class before the study closed let me attempt to implement. Also nice that researchers were responding to posted comments.”

Posttest scores and participant assigned condition. Due to the small sample size, to increase power, alpha was set at .10. Results of the ANCOVA revealed a significant main effect of condition on educational research knowledge, $F(2, 31) = 2.84$,

$p = 0.074$, $\eta^2 = .16$, with an observed power of 0.65. To investigate further which condition had the biggest effect on participants' content knowledge, a pairwise comparison was run (Table 3). Results showed that the vicarious experience condition experienced a greater gain in educational content knowledge compared to the natural blog condition. No other differences were found. These results are elaborated in the discussion section next.

Table 3: *Pairwise Comparison Results*

Participant Assigned Condition	Participant Assigned Condition	Mean Difference	Standard Error	Significance
Control	Natural Blog	1.180	1.392	.403
	Vicarious Experience	-2.388	1.481	.117
Natural Blog	Control	-1.180	1.392	.401
	Vicarious Experience	-3.567	1.511	.025
Vicarious Experience	Control	2.388	1.481	.117
	Natural Blog	3.567	1.511	.025

CHAPTER 5

Discussion

The interest for this research was originally sparked after reading Anderman's (2011) "Educational Psychology in the Twenty-First Century: Challenges for our Community," which highlighted the lack of communication between researchers and practitioners. Through a series of Anderman's recommendations, I chose to assess whether variations in the approach to communication was effective in increasing teacher content knowledge as measured through learning gains. Given its accessibility for teachers, this research examined the use of social media as a communication platform with varying levels of scaffolding. The variations in scaffolding came from the communication features and modeling provided through the social media features and comments on specific blog posts. This study had two main goals: first, to provide teachers with a comprehensive, accessible, and applicable resource for educational research and, second, to assess whether this resource was effective in increasing teachers' content knowledge of educational research. In the context of this research, social media not only provided reliable access between parties, it acted as a dissemination platform for researchers to share their findings with teachers and a resource for teachers to connect with researchers.

The research questions were: (1) Does exposure to a learning community that pairs educational research theories with classroom activities and provides opportunities to socialize increase teachers' levels of educational research knowledge when compared to the same learning community without features of communication? (2) Does exposure to an online learning community that implicitly models research-based classroom activities

through writing influence teachers' levels of educational research knowledge? The hypothesis was that teachers in both blog conditions would learn more over time through features of social media that foster communication and knowledge generation compared to teachers in the control condition, and that teachers in the vicarious learning condition (via modeling) would learn more than teachers in the natural blog condition (no modeling). This increase in knowledge from the blog conditions was predicted to be a result of the communication features of the blog that allowed participants to communicate not only with each other but also with the researchers. The modeling within the comments of specific blog posts was a reflection of social cognitive theory's vicarious experience, which is said to influence learners' self-efficacy and, in turn, their task completeness (Schunk, 1989).

Results revealed that teachers across all three conditions experienced a significant increase in content knowledge and that, as predicted, teachers in the vicarious blog condition learned more than teachers in the natural blog condition. Counter to my first hypothesis, however, there was no difference in content knowledge between the vicarious condition versus the control condition, although the difference was trending toward significance. As noted in the limitations section, a likely reason for this lack of difference was due to the small sample size and, thus, low power to detect a difference. The theoretical implications of these results are addressed next.

Theoretical Implications

The main distinctions between a blog and a static website is that a blog is continuously updated with new and different information, and that it provides a variety of communication features (comments, sharing, linking to different online platforms,

etcetera). Based on the non-significant difference between posttest means of the static website condition and natural blog condition and the significant difference between the natural blog and vicarious experience conditions, we can make the assumption that the distinction between these groups is the modeling within the vicarious group. Learning may not be enhanced via communication, as originally hypothesized, but rather by the modeling provided by the comments purposefully planted to enhance vicarious experiences on the blog. Although the numbers were particularly small with regard to teacher comments, it may be the case that teachers in the vicarious condition were more engaged during learning. Future research is necessary to fully explore this possibility, especially with larger sample sizes.

It is difficult to make sound assumptions based on this study, as the sample size was far too low. The barriers posed by Vanderlinde and van Braak (2010) stated that the teachers in their study felt that, even if they had access to educational research, they did not believe it made a positive impact on their instruction. Anderman (2011) posed the same idea: that teachers' general belief of educational research is that it is too far removed from practical applications and therefore not useful to their practice. These stigmas placed on educational research theories may have an influence on teachers' levels of motivation to learn the material and participate in the study.

Based on the open-ended responses received from teacher feedback, one can make the assumption that although teachers had a generally positive experience, they often did not have time to make research a priority. More specifically, participant teachers appreciated conversations with the researchers, but they felt they did not have

time during the normal work hours to read the blog. Participants did not specify what made the task time consuming, but this is an important consideration for future research.

Social cognitive theory. Based on these findings, an important question is whether online environments that use features of social media can provide an avenue for observational learning. For instance, the comments provided on how teachers integrate iPads in the classroom could serve as modeling for teachers who have yet to use iPads; modeling through the communication features of social media would therefore, ideally, enhance learning. As discussed earlier, social cognitive theory asserts a number of factors that influence whether a model will enhance performance: the degree to which the learner relates to the model, the amount of motivation a learner feels to engage in the task, and the amount of reinforcement learners receive for pursuing the task (Bandura 1977; Schunk, 1987, 2012). The vicarious blog condition did not provide reinforcement, however it did provide a present and relatable model with written modeling of the task. As discussed earlier, the reinforcement is not a necessary component for learning, but it is for performance.

Modeling can come in all forms, physically, verbally, pictorially, and written (Bandura, 1977). As outlined in previously mentioned literature, modeling is successful in enhancing learning performance through video (Honebein et al., 1993), as well as explicitly though physical actions and implicitly through writing (Jay, 2002). Although Jay (2002) found the explicit modeling to result in higher performance, both modeling conditions resulted in learning. The results of this study found that exposure to modeling through written comments on blog entries increased participants' posttest assessment

scores. From this, we can gather that written models through online social media platforms may act as an observational learning environment.

Engagement theory. One particular learning theory that addresses pedagogical advantages of social media is engagement theory (Kang et al., 2011). It proposes that users need to be active participants for learning to occur. Technology, combined with the opportunity to personalize one's learning provided by social media, motivates learners to be active agents during learning and supports the theory of engagement (Kang et al., 2011). Tang and Lam (2012) suggest two main factors of engagement theory in learning through online learning communities: (1) participants are actively engaged with the community; and, (2) participants are actively engaged with each other.

To ensure active participation, Glogoff (2005) recommends fostering communication through comments and linking participant blogs through similar ideas. His modeling of engagement as well as sparking communication among participants increased blog use and enhanced learning. This may explain the greater learning gain in the vicarious experience group compared to the natural blog condition. That is, the vicarious experience group entered the blog with previously supplemented comments that modeled classroom activities, which may have encouraged teachers to engage more in the blog given the perception that other teachers were also using the blog; as a result of this, these teachers may have learned more. Based on the percent of engagement discussed above, users in the natural blog condition may have not been as motivated to engage with the blog since the level of engagement from other users was low, which may have diminished learning due to a decrease in participation.

Conclusion

The study conducted addressed many important issues within the educational research community. We first attempted to facilitate a system of communication between teachers and researchers that tackled previously addressed issues. This system of communication allowed researchers to disseminate their findings and teachers to learn more about educational theories. Second, we addressed the features of online learning platforms that, after this study, might also include the use of written modeling. The limitations of this study, such as the sample size, may motivate the attempt of recreating a similar environment to investigate the same issues. The investigation of the two addressed issues will allow for furthering the effectiveness of online learning platforms as well as the communication among active parties within the education community.

Importance of the study

Bridging the gap. This study attempted to bridge the communication gap between theory and practice. As stated previously, there are two camps of researchers who debate the importance of using educational research as solutions to practical problems within the classroom. The camp that believes that theory does not directly apply to practical problems and that educational research should mainly focus on maintaining its reliability and validity to further educational knowledge is not completely wrong. It is important to conduct research with integrity to further advance knowledge. However, it is equally as important for researchers to mobilize knowledge that ensures equal benefit for the broader educational community. This was the primary goal for this research by bridging the gap between theory and practice.

To address this gap, social media was used as a mechanism through which teachers could learn about educational theory. As online learning becomes more popular,

it is important that those within the educational community understand how to use it to its fullest potential. It is researchers' responsibility to provide teachers with access to our current work to facilitate their knowledge growth in ways that can be translated into classroom practice.

Limitations and Directions for Future Research

Each research study is not without its limitations. Here, I address some of the more pressing limitations that arose from this research. First, the sample size from this study was particularly small, which limited the power to detect differences between groups. As such, it is difficult to speculate as to why differences did or did not occur between groups. Although there were 100 teachers who volunteered to participate at the outset of the study, only 35 teachers completed the study. This is lower than the suggested minimum amount of 30 per condition to run a quantitative analysis. As such, the sample size does not provide enough power to accurately reflect possible trends.

Second, the assessment used to measure teachers' educational research knowledge had not been used prior to this study. Although four members of the educational research community reviewed the items that were used to measure teachers' knowledge, the assessment may not have been as valid as hoped. However, as stated above, it is not accurate to definitively pose a lack of validity onto the assessment with such a small sample size. Future research is needed that includes a far larger sample size to address these issues.

Modeling through social media. Although there is a rich body of literature on the importance of modeling in learning and learning through social media (Schunk, 1990; Bandura, 1977; Jay, 2002), there is a lack of literature that measures learning through the

scope of modeling on an online platform through social media. Modeling through social media can come in many forms: written through comments or whole blog entries as well as physically and visually through videos. The link between modeling through social media and learning is an untapped resource for understanding how individuals can use social media to enhance their learning; when exploring online, they are often looking for a model to complete the task first prior to attempting it on their own. There are many ways learners can turn to features of social media for modeling a task, and as learning becomes more common through online platforms, it is researchers' responsibility to understand features of how to teach effectively on all platforms.

Teacher- or student- created blogs and learning. One very common use of blogs is as a personal reflection tool. Many teachers assign blogs to students to use as a platform to summarize and reflect on what they have learned. It is said that blogs empower writers when they are involved in and in control of publicly expressing their ideas and receiving feedback about them (Kang et al., 2011). Possible future research could measure knowledge gains for those who use blogs as a reflection tool versus those who do not.

Hybrid learning. Social media is an effective strategy for blending in-person teaching with online learning. Blogs allow individuals to interact with experts on a specific topic that may not be available to interact with in person. Hybrid delivery can be defined as a learning environment that combines face-to-face instruction with different forms of media (video, digital text, audio, etcetera) (Terry, 2007). Blogs as learning environments provide a platform of resources that promote a network of similar resources as well as conversations. Blogs used as a blended learning classroom tool to

enhancement student experience is becoming more popular (Glogoff, 2005, 2003; Huffaker, 2005). Measuring learning in a hybrid learning environment that uses a blog versus a purely online or purely in-person learning environment would provide the educational community with insight as to how a variety of learning environments may influence learning.

Features of social media facilitate many different forms of learning, both formal and informal (Dabbagh & Kitsantas, 2011). Through the use of social media, learners have the opportunity to explore topics they find interesting. When individuals are provided choice for learning tasks, this increases motivation and sense of control for learning (Ames, 1992; Deci & Ryan, 2008). With scaffolding from an instructor or the students' learning environment, social media can provide a platform for a combination of self-directed and guided discovery learning (Glogoff, 2005; Woodzicki, Schwämmlein, & Moskaliuk 2012). Scaffolding can also come from an online model who has pursued the task previously and has detailed its necessary steps. Learning through vicarious experience, as a part of social learning theory, is typically discussed in terms of first-hand experience. It is not often referred to when discussing a virtual or intangible model (Bandura, 1977). The lack of exploration of virtual modeling within the educational research community is a void in the current literature. To keep up with popular methods of learning, using online platforms, educational research should shift to this direction.

Concluding thoughts. This study, originally designed to bridge the gap between research and practice, assessed whether learning can be enhanced and modeled through the use of social media. To further the educational practices of our schools, it is necessary for researchers and teachers to communicate their experiences (their needs, results, ideas,

etcetera). By increasing communications between researchers and teachers, both parties can benefit by translating theory intro practice.

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APPENDIX A

Consent Form

TITLE OF STUDY: Communicating Educational Research to Teachers Through Features of Social Media and Modeling on a Blogging Platform

INVESTIGATORS: Meredith Derian-Toth (M.A. student), Krista Muis, Ph.D. (faculty supervisor).

(Note: The consent form will be placed on official McGill letterhead)

Purpose of the study:
This is an opportunity to be a part of an honest attempt at connecting teachers and researchers in order to make our education systems better. Not only will teachers have access with current, applicable educational research in technology, but they will also be able to communicate with researchers on any issues theoretical or practical in implementation. Here is a chance for teachers to give their voice in educational research in a discussion-based forum, which has yet to be attempted. We will use participant data to measure self-efficacy and outcome expectations gained from participating in a learning community rooted in education research.

Participants:
You are being asked to participate in the study because you are a practicing teacher.

Procedures:
If you would like to participate, we will ask you to complete a questionnaire including items requesting basic background information, as well as items that assess your educational psychology topic knowledge. You will be asked to review readings at least once per week and provide researchers with feedback, possibly in the form of comments on the related to incorporating technology into classrooms. Your feedback will be anonymous to other participants, but researchers will have the ability to connect your randomly assigned ID number with your email address. This study consists of two parts: Part 1 requires the completion of an assessment (approx. 15-20 minutes) before the study begins, and Part 2 will be a second assessment conducted one month later (approx. 15-30 minutes). This assessment will be similar to the first, with different questions addressing the same topics. There will be a few participants randomly selected for an online interview via instant messaging within a month of the completion of the study. The study is completed entirely online to facilitate accessibility.

Benefits of Participation:
Possible benefits from study participation include an opportunity to converse with educational researchers about research pertaining to their classrooms, have direct feedback from researchers on related questions, and an opportunity to try out new classroom activities.

Risks of Participation:
There are risks involved in all research studies. This study is anticipated to include only minimal risks. A possible risk of participation in this study is mild anxiety that may be associated with completing an assessment.

Contact Information:
If you have any questions or concerns about the study, you may contact the principle investigator Meredith Derian-Toth at Meredith.derian-toth@mail.mcgill.ca, or the supervisor Dr. Krista Muis at (513)-398-3445 or, Krista.muis@mcgill.ca. For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted you may contact the McGill **REB office at (514) 398-6831 or at Lynda.mcneil@mcgill.ca.**

Voluntary Participation:
Your participation in this study is voluntary. You may refuse to participate in this study or in any part of this study. You may withdraw at any time without prejudice to your relations with the university. You are encouraged to ask questions about this study at the beginning or any time during the study.

Confidentiality:
All information gathered in this study will be kept completely confidential. No reference will be made in written or oral materials that could link you to this study. All records will be stored in a locked facility at McGill for at least 5 years after completion of the study. After the storage time the information gathered will be destroyed. All identifying information will be destroyed after the study has been completed with the exception of the consent documents. All identifiable information will be exclusively available to the faculty supervisor (Dr. Krista Muis) and Principal Investigator (Meredith Derian-Toth). The intended dissemination exclusively by Dr. Muis and Meredith Derian-Toth will be through academic journals, as well as possible conferences.

Participant Consent:
I have read the above information and agree to participate in this study.

(Participants will be asked to enter their names and the date electronically).

Participant Name Date

APPENDIX B

Demographic Questionnaire

QUESTIONNAIRE ITEMS

Demographics

_____ Age (in years)
_____ Gender (F or M)
_____ Marital Status
_____ Ethnicity
_____ Highest Level of Education
_____ Survey Method (computer, smartphone)
_____ Location
_____ School Name
_____ Years of Practice
_____ Primary/Preferred Subject of Instruction
_____ Primary/Preferred Level of Instruction (primary, secondary, post-secondary)

Social Networking Familiarity

How frequently do you visit weblogs (blogs)?
Never Once/month Once /week Once/day Several times/day

What do you view blogs for?
I don't view blogs Teaching Ideas/Instructions Hobby/Other Interests

Have you ever created your own blog?
Yes No

How frequently do you visit social networking sites such as Twitter, Facebook, or Pinterest?
Never Once/month Once /week Once/day Several times/day

APPENDIX C

Pretest

Pretest:

Augmented Reality

1. What is augmented reality in education?
    a. Changing ideas from one point of view to another
    b. Contextualization of learning by highlighting shared characteristics between the learning and external environments.
    c. A learning environment that combines features of face-to-face learning with different forms of media.
    d. The invisible integration of assessment into the learning environment

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

2. What supplementary material can an instructor use to keep the learning environment up to-date with a dynamic outside world?
    a. QR codes
    b. Written essays
    c. Textbooks
    d. Guest speakers

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

Hybrid Learning:

1. What is a hybrid learning environment?
    a. An environment highlighting shared characteristics between the learning and external environments.
    b. One-on-one learning, rotating through disciplines without the expectation of developing an expertise
    c. A classroom composed of teacher- to- student instruction as well as peer-to- peer instruction
    d. A learning environment that combines features of face-to-face learning with different forms of media

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct

3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

2. How can an instructor create a hybrid-learning environment?
    a. Flipping the classroom
    b. Reciprocal teaching through reading discussion
    c. Allowing more student-choice in academic tasks
    d. Integrating assessment invisibly into the learning environment

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

Stealth Assessment:

3. What is stealth assessment?
    a. Bringing in an assessment expert into the classroom to assess students performance
    b. Allowing students to invisibly assess their peers
    c. The invisible integration of assessment into the learning environment
    d. Combining peer-assessment with teacher-assessment to decide student grades

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

4. What motivates students outside the classroom that can also be used for a stealth assessment tool in the classroom?
    a. Video games
    b. Journaling
    c. Group projects
    d. Facebook

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

Cognitive Apprenticeship

5. What is cognitive apprenticeship?
    a. One-on-one learning, rotating through disciplines without the expectation of developing an expertise
    b. A classroom environment where the teacher vocalizes metacognitive processes
    c. One-on-one learning for the sake of becoming an expert
    d. Autonomously learning a task for the sake of becoming an expert

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

6. How can an instructor create an environment where the student-to-teacher ratio appears to be smaller?
    a. Group projects among peers
    b. Reciprocal teaching between peers
    c. Allowing more student-choice in academic tasks
    d. Flipping the classroom

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

Learning by Teaching

1. What is learning-by-teaching?
    a. One-on-one learning for the sake of becoming an expert
    b. A learning environment that combines features of face-to-face learning with different forms of media.
    c. Approaching a task with the intent of instructing others
    d. The integration of assessment invisibly into the learning environment

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

2. Which of the following set of teaching methods listed are ranked from surface-level to a deep-level learning?
    a. Teaching, reading, practice
    b. Practice, teaching, reading

c. Students learn equally with each teaching method
d. Reading, practice, teaching

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

Sparking Student Interest

1. What is the difference between individual and situational interest?
    a. Individual interest is voluntarily revisiting a task whereas situational interest is temporary
    b. Individual interest is temporary whereas situational interest is voluntarily revisiting a task
    c. Individual interest refers to individual students whereas situational interest refers to a whole class
    d. Individual interest refers to a whole class whereas situational interest refers to individual students

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

2. How can a teacher maintain student interest in the classroom?
    a. Foster student enjoyment through comfortably challenging tasks
    b. Use a Smartboard during lectures
    c. Hold class in an active learning classroom
    d. Allow students to work in groups

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

Conceptual Change

1. What is conceptual change?
    a. Transferring an idea or piece of knowledge from teacher to learner
    b. Changing misconceptions to accurate pieces of knowledge
    c. Changing the teaching approach from teacher-centered to student-centered.
    d. Approaching a task with the intent of instructing others

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

2. How can instructors identify misconceptions of knowledge in the classroom?
    a. Reciprocal teaching between students
    b. Openly discussing the topic before the lesson begins
    c. Surprising students with a pop quiz before introducing the material
    d. Misconceptions are not a common occurrence in the classroom

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

Attributional Retraining

1. What is attributional retraining?
    a. Teaching students how to personalize their learning
    b. Learning how to accurately rationalize reasons for specific performance outcomes
    c. Training students and teachers to work as a team to build classroom material
    d. Enrolling teachers in professional development workshops to learn how to implement new teaching practices in the classroom.

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

2. How do student attributions affect their performance?
    a. Inaccurate attributions lead to positive performance
    b. Accurate attributions lead to poor performance
    c. Student attributions don't affect their performance
    d. Accurate attributions lead to positive performance

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect

1= absolutely sure it is incorrect

APPENDIX D

Posttest

Multiple Choice
Augmented reality

1. Using digital material to link the external environment with the learning environment refers to:
    a. Stealth assessment
    b. Augmented reality
    c. Gamification
    d. Hybrid learning

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

Hybrid Learning:

1. Combining inherent features of face-to-face instruction with different forms of media refers to:
    a. Gamification
    b. Augmented reality
    c. Hybrid Learning
    d. Learning by teaching

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

Attributional Retraining

1. When teachers feel as though they are unable to cope with the demands of their work, this refers to:
    a. Conceptual change
    b. Inaccurate attributions
    c. Teacher burnout
    d. Perceived control

How sure are you that this answer is correct?

5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

Stealth Assessment

1. Using games as a vehicle to engage students and measure their understanding of the material is an example of :
    a. Stealth assessment
    b. Cognitive Apprenticeship
    c. Augmented reality
    d. Attributional retraining

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

Conceptual Change

1. The evolution of misconceptions into accurate pieces of knowledge refers to:
    a. Cognitive apprenticeship
    b. Professional development
    c. Learning by teaching
    d. Conceptual change

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

Learning by teaching

1. Learning in the process of teaching a peer, preparing to teach, or teaching a computer agent refers to:
    a. Hybrid learning
    b. Learning-by-teaching
    c. Cognitive apprenticeship

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

Cognitive Apprenticeship

1. One-to-one learning, with a focus on the mental process of learning, for the sake of becoming an expert refers to:
    a. Cognitive apprenticeship
    b. Reciprocal teaching
    c. Learning by teaching
    d. Conceptual change

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

Sparking student interest

1. Interest can be fostered by what two characteristics of a classroom:
    a. Novelty and complexity
    b. Motivation and enjoyment
    c. Intrinsic and extrinsic motivation
    d. Individual and situational interest

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

Problem Statements:

Hybrid Learning:

Professor Pain has been teaching an online calculus class for the past three summers and notices a difference between those students and the ones in the face-to-face class during the academic year. His summer students were not as collaborative with each other, less engaged in extra credit options, and less interested in the extra curricular calculus activities he suggested. He has sent out surveys to his summer students looking for feedback on how to make the online class more interesting and engaging but has not received too many concrete suggestions.

Application

1. What changes can Professor Pain make to help his summer students relate to the online material?
    a. Participate in mystery location calls
    b. Conduct after-hours face-to-face review sessions
    c. Link his material to Khan Academy Youtube videos
    d. Host a guest speaker using video conferencing

How sure are you that this answer is correct?
5= absolutely sure it is correct

4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect
Evaluate

2. According to what you've read, the reaction from the online cohort in comparison to the face-to-face students is most likely a function of what?
    a. Students' level of interest in the material
    b. Students' level of motivation
    c. Students' sense of community with one another
    d. Students' level of relatedness to the material

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

Attributional retraining

Mr. Marshal is a high school chemistry teacher who has a reputation around the school of being one of the hardest courses to pass. He has attempted to alter this reputation by presenting the material in a new way, where he has succeeded in getting students interested and engaged in the material. However, he still has a select few students who have an excellent performance record, but are still having trouble in his class. These students have low motivation, recurrent failure in his class, and negative affect. Mr. Marshal took these students aside individually to inquire about their performance and found that they each seem to feel that chemistry is such a difficult class that no amount of effort could impact their performance.
Evaluate:

1. What consistency do you find among the students who are having trouble in Mr. Marshall's class?
    a. They are inaccurately attributing their poor performance to something out of their personal control
    b. They are not putting as much effort into Mr. Marshall's class in comparison to their other classes
    c. They have distractions outside of school preventing them from putting effort into Mr. Marshall's class
    d. They have an undiagnosed learning disorder preventing them from focusing on the material in Mr. Marshall's class

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect
Application:

2. What strategies from educational research can Mr. Marshall apply in the classroom to prevent this from happening to other students as well as assist the currently troubled students?
    a. Attributional retraining
    b. Stealth assessment
    c. Spark curiosity and foster enjoyment
    d. Test for learning disorders

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

Stealth Assessment

Professor Pratt is a middle school math teacher whose students score high on homework assignments but poorly on exams. He knows that these students have the potential to perform higher, but can't find an effective way of assessing them. He has offered these students more time, a separate testing space, and more resources during the tests but nothing works. He would like to come up with a different way of assessing these students, but can't seem to find one.

Application

1. Which assessment method is more appropriate for Professor Pratt?
    a. Cognitive apprenticeship
    b. Anonymous assessment
    c. Stealth assessment
    d. Peer assessment

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

Evaluate

2. Based on what you read, what method of teaching can Professor Pratt implement to foster the assessment method from above?
    a. Gamification
    b. Reciprocal teaching
    c. Learning by teaching
    d. Hybrid learning

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

Conceptual Change

Mrs. Manning is a 3rd grade elementary school teacher who loves teaching her students about animal characteristics. She does an entire unit on animal site where she encourages her students to choose an animal and teach the class about the anatomy of its eyes using a piece of technology. One particular student chose a bat and presented on how bats can't see out of their eyes and instead use echolocation to sense their environment. She knew this was not completely correct, but did not interrupt the student's presentation. She readdressed the issue when the class had an opportunity to talk in groups about each animal that was presented. As she went from group to group, she quickly learned that each student thought the same thing about bats, stating "that's where the saying, 'as blind as a bat' comes from." Mrs. Manning realized how misconceptions start and spread in the classroom, and she'd like to prevent this from happening with other units.

Evaluate

1. What assumption did Mrs. Manning mistakenly make before starting the unit on site?
    a. Students are interested in learning about animals' site
    b. Students came into the assignment with no misconceptions about the material
    c. Students enjoy learning about animals' site
    d. Students would prefer to teach each other about animal site

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

Application:

1. What is the value of conceptual change in the classroom?
    a. It provides scaffolding for integrating technology into the classroom
    b. It provides a space for teachers to easily integrate technology into the classroom
    c. It provides a space for students to teach each other the specific material
    d. It prevents the further development of inaccurate knowledge between peers

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

Augmented Reality:

Mrs. Muyskens is a high school history teacher who does a unit on the city's history every year even though the students don't seem to be especially interested. She would

like to make history come to life, but hasn't found a teaching method that accurately contextualizes the city's history. She would like to use technology to bring the city in the classroom, but can't find the right tools to do so. She has a rich environment outside the classroom that the students can learn from, and needs to find a way to connect it to the students' learning environment.

Evaluate

1. According to what you've read, what teaching method can Mrs. Muyskens integrate to contextualize student learning?
    a. Augmented reality
    b. Stealth assessment
    c. Gamification
    d. Learning by teaching

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

Application

2. What is the value of fostering student interest from the contextualization of the learning environment?
    a. It creates a learning environment for an instructor to easily implement stealth assessment
    b. It provides the students with a learning environment where they can more easily personalize their learning
    c. It fosters enjoyment in the classroom and encourages students to voluntarily engage in those tasks that interest them
    d. It fosters morale among the students and allows for a more comfortable learning environment

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

Learning by teaching

Dr. Dufort has been teaching 8th grade earth science for the past 10 years and is interested in changing up his teaching methods. His typical lesson can include some lecture, some rock or soil samples, and often students working in pairs from the textbook. He finds the students are performing well on the recall multiple choice test questions, but when it comes to the recognition and inference questions students have a hard time applying the material. He would like students to have to a deeper understanding of the material as well as create a more student-centered learning environment..

Evaluate

1. What teaching method is most appropriate for Dr. Dufort to implement based on his intentions of promoting deeper learning and a student-centered learning environment?
    a. Stealth assessment
    b. Cognitive apprenticeship
    c. Gamification
    d. Learning by teaching

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

Application

1. What is the most valuable feature of fostering deep learning from learning by teaching?
    a. The intention of teaching
    b. Peer-to-peer tutoring
    c. Working directly with an expert
    d. Contextualizing the learning through samples in the classroom

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

Cognitive apprenticeship

Mrs. Marley is a new high school math teacher with her first large class of 25 students. She is not completely comfortable with the student-to-teacher ratio but understands that she will have to adapt and teach the best she can. Her first few lessons she found that there were varying levels of student understanding and was balancing the pace of the lecture between the students who were learning quicker than others. As a quick fix to this problem she gave the quick learners iPads to play with while she spent more time with the slower students. She knows that this is not a sustainable solution but can't seem to adapt to the new student-to-teacher ratio.

Evaluate

1. According to what you've read, what would be a more effective solution for Mrs. Marley's problem of student to teacher ratio?
    a. Stealth assessment
    b. Reciprocal teaching
    c. Gamification
    d. Augmented reality

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct

3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect
Application

2. What is the original model of thinking that the above answer evolved from?
    a. Standardized testing
    b. Hybrid learning
    c. Cognitive apprenticeship
    d. Contextualizing learning

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

Sparking student interest:

Mrs. Masters is a high school history teacher who is having trouble motivating her students to participate in class discussions. She is currently doing a unit on revolutionary wars around the world and, despite the fact that they have expressed interest in this material in the past, they are still unengaged. She heard that students are more interested in and focused on the material when technology is incorporated into teaching. So, she decided to use a Smartboard to projector her powerpoints. However, the students are still uninterested in learning the material and continue to show signs of boredom.
Application:

1. What approach would be more appropriate for Mrs. Masters to spark student interest in the classroom?
    a. Use the Smartboard in a more interactive way to spark students' curiosity
    b. Use the Smartboard to lecture using a different software than Powerpoint
    c. Do not use the Smartboard, it distracts students from the material and fosters boredom
    d. Continue to use Powerpoint as a software to lecture material, but use a different means to project the slides

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect
Evaluate:

2. What false assumption did Mrs. Masters make about incorporating technology in the classroom?
    a. That a Smartboard is considered educational technology
    b. That adding a Smartboard to the same teaching method will spark student interest

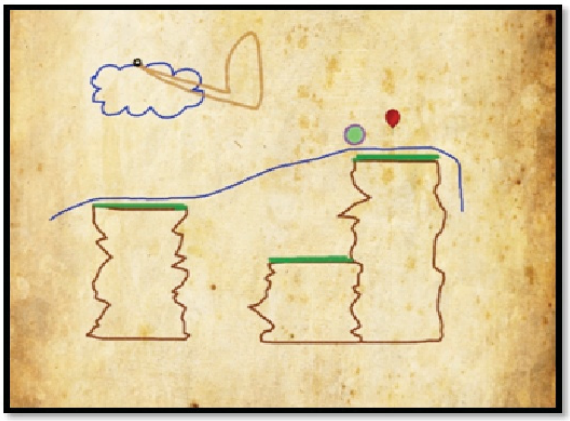
c. That the students were bored, when they were actually paying close attention
d. That incorporating technology in the classroom will spark students' interest

How sure are you that this answer is correct?
5= absolutely sure it is correct
4= sort of sure it is correct
3= no idea whether it is correct
2= sort of sure it is incorrect
1= absolutely sure it is incorrect

APPENDIX E

Blog Posts

How stealth assessment can bring together engagement, learning, and assessment
Valerie Shute & Yoon Jeon Kim (Florida State University)



Are your students excited to be at school? Do they enjoy spending hours doing school work and homework? Some might say that learning is supposed to be tough (as the saying goes, "No pain, no gain"), and that students learn important life skills (e.g., perseverance) by enduring tedious school-related activities and assignments. But does so much of school really have to be tedious and boring? A common and growing problem with schools today – especially with the large focus on "teaching for the test" – involves unmotivated students. According to a recent report released by a special committee on student motivation, 40% of high school students, especially Hispanic and Black students, are currently unmotivated by and thus disinterested in and disengaged with school. But these same disinterested students may act completely different when they go home and turn on their gaming consoles. In that context, they are passionate about playing their favorite games and willing to spend hours playing, even if the game often frustrates them. And when asked about their gameplay, they can give you in-depth information about the game (strategies, content, and so on) regardless of the game's complexity. This raises the question: How can we bridge what students do inside of school with things that excite them outside of school?

Advocates of using games for learning argue that well-designed games share features with the best learning environments. Some of these overlapping features include providing (a) an environment and context that deeply engages learners, (b) control of the environment and learning path, (c) steady doses of success as players solve problems (where failure is not a bad thing but a necessary part of learning), and (d) immediate feedback on players' performance in the game, via badges, gains in rank, and scoreboards. Good games also provide problems that are "pleasantly frustrating," where players find problems challenging yet ultimately doable. In psychology, the area where the difficulty of a task hovers at the boundary of a student's ability is called the zone of proximal development. In games, this refers to a state of *flow*—where a person is so

engaged in the activity at hand that self-consciousness disappears and sense of time is lost.

Research

Our solution to the problem of unmotivated kids in school involves using games as the vehicle to engage students, then measure and support their learning–of cognitive and noncognitive variables. This approach is called stealth assessment, which weaves assessments directly and invisibly into the fabric of the learning or gaming environment (Shute, Ventura, Bauer, & Zapata-Rivera, 2009). During gameplay, players naturally produce rich sequences of actions as the result of continuous interactions with problems and tasks. For example, when you play *Angry Birds*, each interaction you have with the game (e.g., changing the angle of the sling shot) provides particular information about your problem solving skills, some basic knowledge of physics, and even your persistence (especially if you stay with a level until you receive all three gold stars). In stealth assessment, evidence needed to assess targeted skills is thus provided by players' interactions with the game itself (i.e., the processes of play). Also, inferences about current proficiency levels on targeted skills are continuously captured and updated in a dynamic model of the learner.

We developed a game called *Newton's Playground* to help students (in grades 6–12) understand informal physics. Informal physics is defined as the conceptual understanding of how the physical world operates, and in our case, it is characterized by an implicit understanding of Newton's three laws, balance, mass, gravity, conservation of momentum, potential and kinetic energy.

Newton's Playground is a computer-based, two-dimensional game that requires the player to guide a green ball to a red balloon. The player can nudge the ball to the left and right (if the surface is flat) but the primary way to move the ball is by drawing/creating simple machines (which are called "agents of force and motion" in the game) on the screen that "come to life" once the object is drawn. Everything obeys the basic rules of physics relating to gravity and Newton's three laws of motion. Here is a short video of some problems being solved in Newton's Playground.

The stealth assessments that are directly built into the game capture and analyze the log data produced by the player's interactions with the game. This information is then used to make inferences regarding the player's informal physics understanding and build the player's profile showing one's areas of strength and weakness in terms of various principles of physics. In a recent study using the game, we examined gameplay and learning. Our sample consisted of 165 8th and 9th graders who played Newton's Playground for about four hours. Findings include significant pretest-posttest physics gains, and significant relations between in-game indicators and learning.

Classroom Activities

There are multiple activities that teachers can use with the game in the classroom. From a workshop we organized for teachers, we learned that teachers enjoy playing Newton's Playground just as much as students. One idea is to use the built-in "level editor" in the game, where students and teachers can create levels to share with others. They can save

particularly creative solutions and then share them with the class. This could serve as an engaging way to discuss physics principles and misconceptions. A related idea is to have teachers and students create their own levels, controlling specific physics parameters like ball/object mass, friction, gravity, buoyancy, time dilation and other physics parameters to illustrate particular points.

We can also envision teachers embedding Newton's Playground into their existing physical science curricula. This would involve linking formalizations (e.g., F = ma) to relevant game problems for instructional support. The goal would be to wrap classroom activities around the game—lesson plans, events (e.g., student levels demonstrated and discussed in class), and so on. Additional physics concepts that are not already in the game can be developed via new levels such as 1d motion, distance/time/speed and velocity, 2d motion, freefall, force diagrams, conservation of momentum, and other forces and energy. You can find a link here to download Newton's Playground.
In conclusion, well-designed games are a potentially powerful vehicle to support learning – especially in relation to competencies needed to succeed in the 21st century (e.g., work well in diverse teams, identify and solve complex problems with innovative solutions, communicate effectively, and think critically). Right now, there are just a few (but a growing number of) experimental studies examining the range of effects of gaming environments on learning, but we believe that the new games-and-learning research stream is highly relevant and important to education,
Anyone who makes a distinction between games and learning doesn't know the first thing about either.
~Marshall McLuhan

For more information on Dr. Shute's research visit http://myweb.fsu.edu/vshute

Sparking Student Interest

Tara Tressel

It has been found that during the course of schooling, *students' interest in most school subjects is on a steady decline* (Hidi, 2000; Krapp, 2002). Keeping students interested in learning, and in the topics we are teaching, is a critical aspect to education. Yet most

teachers can attest that interest is not easy to maintain, or even spark. In this post, we are going to take a brief look at the many facets of interest, and how we can improve our classroom to keep our students intrigued.

In educational research, we define two different types of interest: situational and individual. According to Schiefele (2009) situational interest is short-term; it involves focus, increased cognitive functioning, persistence, enjoyment, and curiosity. Individual interest also shares some of these characteristics, except individual interest is not short-term. Instead, individual interest means voluntarily returning to the *same task repeatedly*. Immediately, we can see the benefit of maximizing individual interest. Any learner who shows individual interest toward a topic is more likely to persist in their learning, despite difficulties. Interest, then, is considered a motivational aspect in education (Schunk, Pintrich, & Meece, 2008). But, we should not confuse interest with motivation. The difference between these two terms is that motivation is "the state of wanting to perform a specific activity in a given situation" (Schiefele, 2009), while interest is a relationship that occurs between an individual and an object, activity, or subject area (Schiefele, 2009).

In the learning process, both situational and individual interests have value. Reminiscent of elementary school writing class, we can think of these two types of interest working together as a 'hook, line, and sinker' mechanism to harness an already sparked situational interest (which has short term effects) in order to develop individual interest (for long term effects).

Interest can be sparked and maintained through a few different methods. According to Schiefele (2009) the combination of novelty and complexity are predicators of interest. If the presented task is at the right level of novelty and complexity so that the student feels curious, they will be comfortable pursuing a challenge. This combination has the potential to foster interest. When students feel curiosity, they tend to be more motivated to pursue and stay involved in a task. If their interest is maintained throughout the task and they end up successfully completing the task, they are then more likely to pursue the same task again.

Classroom Activity: How to catch interest in the classroom with Smithsonian Quests

http://smithsonianquests.org

Smithsonian Quests are for *all* grade levels (activities are tailored to meet age-appropriate skill levels), and for subjects in history, language (speech and written exercises), and science. You can use these quests as supplements to lessons, as homework assignments, or in-class work. Or, you can assign this task to students as a student-driven after-school activity (depending on your age group and resources). The primary purpose of Smithsonian Quests is to help students identify their own interests through a series of online activities, while enhancing students' cognitive capabilities through knowledge and skill-building activities, which are built into the quests. As a teacher, your participation is vital in these quests as you guide learners through the activities by motivating and rewarding their progress by giving awards. You can even use Smithsonian Quest Conferences (http://smithsonianeducationconferences.org/) as a tool for connecting students to classrooms across the world, in addition to Smithsonian experts.

Here are a few examples of quest options:
Civil Rights: Reader
When telling the story of someone's life and their accomplishments, artists often use symbols and clues to help the viewer "read" portraiture. When examining a portrait for meaning, it is best to remember that there are two key elements to understanding: looking and analyzing. You will be given a series of questions to consider when "reading" your portrait. Be sure to include details and spend time on each question as you examine the entire portrait.
Completing this Quest successfully means... You can thoughtfully discuss elements of portraiture and their connection to contributions to history.
Learn Even More: As you may know, a portrait can take form in a number of different media and types of artwork—from sculpture to photographs, from paintings to sketches. **Explore this Feature from the National Portrait Gallery**, highlighting the sculpture of Rosa Parks by Marshall D. Rumbaugh. As you explore the sculpture and how Rosa Parks was portrayed, think about the looking and analyzing questions you learned about in this quest.

Astrophotographer: Enhance It
The raw images that the MicroObservatory telescopes send to you have more hidden information than may appear at first. Like professional astronomers, you'll want to download and work with the special "FITS" format image files. A FITS (Flexible Image Transport System) file is a special high-quality image format that astronomers use. If you download the MicroObservatory Image Software, you can then open the FITS file that is linked to your MicroObservatory telescope image. This will allow you to enhance your image considerably. Watch the video tutorials, "How to download the software" and "How to open and process a FITS image" to help you accomplish these steps.

Orion Nebula Image Captured by the Hubble Telescope

Completing this Quest successfully means...
You have gained important skills of managing and manipulating digital image data to enhance visual interpretation of astronomical objects. For more information on how this quest supports learning, click on this link: http://smithsonianeducationconferences.org/

***Signing up for Smithsonian Quests is free. Teachers create an account, log in, and invite students to participate. Students can start exploring the site at home or in school, depending on classroom resources.

How Smithsonian Quests can spark student interest:

-*Collaboration*: some quests are done in groups, and the social exchange among students enhances the classroom environment (Schiefele, 2009).

-*Situational interest*: students get to choose their activities based on their personal interests while using cognitive skills to complete the tasks.

-*Individual interest:* students who are intrigued by the quests might see an interest in a subject they didn't know they had and return to the quest or look for similar quests based on the subject area. Students can use Smithsonian Quest after school to explore other areas, which might foster their interest in learning.

-*Applicability*: for older students this site could be particularly useful because it connects information to real-life uses. For example, quests look like this: Employ a thought process like a curator, and link artifacts together so that they tell a story. You must provide the background research for an object of your choice (students have to go to a museum and take pictures- this would be a great assignment to supplement a field trip), take photos of the objects, and upload them to the site with a paragraph for each object describing what it is, how it could be used, and what story it tells just by observation.

-*Novelty & Complexity*: because there are a range of activities students can choose from, and the quests allow for personal interpretation, creativity, and individual or collaborative work, students will have a novel experience doing these tasks. The website caters the quests to different age levels, therefore allowing for more difficult tasks for older students which helps prevent boredom.

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Expanding the Learning Environment with Synchronous Hybrid Instruction

Nick Butz and Dr. Robert Stupinski

The face-to-face classroom has long been the traditional learning environment of formal education; however, restricting instruction to on-site activities may no longer be ideal for contemporary students. For example in higher education, students are often bound by work, family, and geography making it difficult, if not impossible, to attend courses on on-campus (Bocchi, Eastman, & Swift, 2004). A recent study by Allen and Seaman (2011) reported a 12.9% enrollment increase in technology-mediated delivery modes, which far exceeded the annual growth of the overall student population (just over two percent since 2002). The ability of technology to control time, place, and/or pace of instruction is also dramatically changing the way students learn in the K-12 sector (Staker & Horn, 2012). This growing need for flexibility has set the stage for rapid innovations in course delivery modes. One way schools have chosen to augment their face-to-face delivery model is by creating hybrid learning environments. Terry (2007) definded *hybrid delivery* as a learning environment that combines the inherent features of face-to-face instructions (e.g., synchronous personal interaction) with different forms of media (e.g., text, audio, video).

Overview of Research on Hybrid Learning Environments

Research in traditional classrooms has shown that students' motivation (Ryan & Deci, 2009) and emotions (Pekrun, 2006) are linked to academic success; however, similar studies of motivation and emotion in hybrid classrooms are less common. The purpose of our current research is to examine the relationships among students' emotions, need satisfaction, motivation, and perceived success in hybrid learning environments. Specifically, the reported research involves students enrolled in hybrid courses facilitated

by Adobe Connect (see Figure 1), which is a proprietary video conferencing software; however, open-access alternatives exist (e.g., Skype, Google+ Hangout).

The findings of this study may be useful to educators who are considering using hybrid learning to enhance their instruction. Aside from the exceptions discussed below, the data showed that online and on-campus students adapt to the hybrid learning environment in very similar ways. No significant differences were found between these groups in regard to motivation, including the extent to which students reported being intrinsically or extrinsically motivated. Means scores based on measures of perceived success also did not differ significantly between the two groups.

The statistically significant findings included that online students reported lower levels of *relatedness* than on-campus students, which has been defined as a psychological need required to become fully intrinsically motivated (Ryan & Deci, 2009). This finding suggests that online learners have fewer opportunities for social interaction compared to on-campus students. In terms of participants' emotional activation regarding technology use, online students reported significantly higher levels of anger, anxiety, and helplessness. From a practical standpoint, the results of this study may be useful to educational practitioners for making decisions about how to manipulate the hybrid learning environment to promote students' motivation and positive achievement emotions in order to enhance their academic experience.

The classroom activities discussed below provide several suggestions for instructional activities that draw on the key features of hybrid learning. Ideally, these activities will help educators apply the research on hybrid delivery in order to expand the learning environment beyond the classroom walls.

Classroom Activities Involving Hybrid Learning

The way course content is delivered drives students' learning outcomes through antecedents such as emotions, need satisfaction, and motivation. In the traditional classroom, these antecedents exist in synchronous face-to-face learning activities. However, when technology is introduced into the learning environment, a number of instructional options emerge that are not restricted by time or place (see Figure 2). In terms of synchronous instruction, Google+ Hangout provides educators with a powerful open-access tool to implement classroom activities that utilize hybrid or video conferencing formats.

1. Host Guest Speakers using Video Conferencing:

Students typically only expect to receive instruction from their teacher. Occasionally an instructor may invite a guest speaker into his or her classroom; however, the pool of available experts was limited by time and place. In essence, video conferencing technology eliminates these constraints. Curts (2013) noted that Google+ enables schools "to reach out and view or participate in Hangouts from other people, places, and groups all around the world" (p. 31).

2. Participate in Mystery Location Calls

Google+ Hangouts also allows for real-time collaboration with classrooms in other schools without the burden of travelling to another location, which can be time consuming and costly. In order to teach deductive reasoning skills, Google+ Hangouts provide a service known as Mystery Location Calls. In this application, a connection is established between two randomly selected classrooms using Google+ Hangouts. Each class then asks yes/no questions and gathers clues to determine the location of the other class; thereby providing students with opportunities to make global connections and improve their problem solving skills (Curts, 2013).

Youtube video on Mystery Location Hangouts in the Classroom: http://youtu.be/d85GCQtJz3E

3. Conduct After-hour Online Review Sessions

As a video conference tool, Google+ Hangout is an effective interface for not only presenting new content in the classroom, but also providing extra help after-hours. With Google+ it is possible to simultaneously interact with up to 15 students in a single Hangout. All members of the Hangout have the option of sharing their computer screens or webcams. The instructor can also broadcast the Hangout so that essentially an unlimited number of students can watch the session live like a videocast or webinar. Furthermore, these sessions can be recorded and archived on YouTube for students to access and review as often as needed (Curts, 2013).

Youtube video Hangouts On Air for Education: http://youtu.be/8pP4cCp-16M

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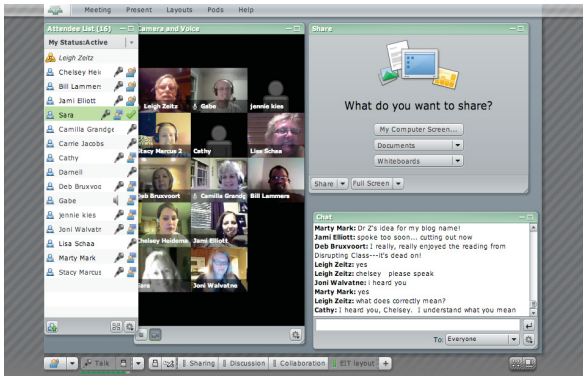


Figure 1. Screen capture of an Adobe Connect session.

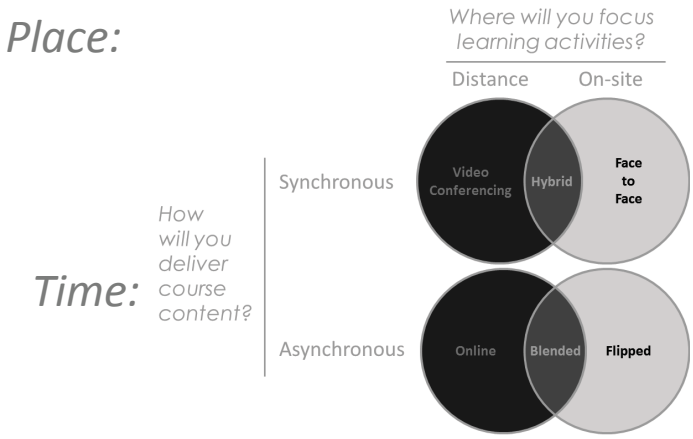


Figure 2. Comparison of technology-mediated instructional options based on time and place.

CREATING AUGMENTED REALITY APPLICATIONS IN HISTORY CLASSROOMS: AN EXAMPLE CLASS ACTIVITY

BY: Eric Poitras

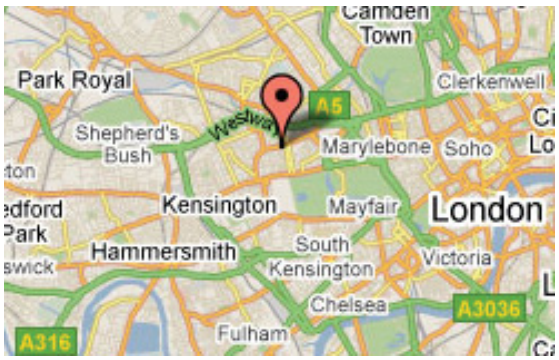
In education, we are always looking for different ways to contextualize the material to keep our students engaged. Technology affords many opportunities to do so; in this article we will be discussing how to create an augmented reality by using digital media.

Augmented Reality (AR) refers to digital materials such as photos, documents, and videos that are displayed by mobile devices based on cues from the external environment. These digital materials serve as a means to *augment* the user experience.

***How it works*:** The mobile device recognizes external cues from the learning environment and delivers the relevant instructional content. External cues include objects and locations that are shared characteristics between the educational material and learning environment. Some cues can be QR codes that are scanned by the mobile devices or geological locations tracked by AR applications using GPS technology.

As an example, history textbooks may include a QR code that can be scanned by students with their mobile device. The student can then have access to videos and pictures pertaining to the time period, and fill out a quiz to assess their learning and provide feedback. An application might also detect where the student is located in order to deliver information. Based on the GPS signal emitted by the mobile device, the application can choose amongst the most relevant topics, such as information about a historical monument when the student approaches the target location.

A QR code (Quick Response code) is a barcode containing encoded information that can be analyzed by AR applications on mobile devices



A GPS (Global Positioning System) signal can be received and analyzed by AR applications on mobile devices

Classroom Activities: The first step in developing AR in a flipped classroom is to separate students into small research groups designed to allow for collaborative exploration of specific historical topics within a unit/classroom. In doing so, each group is tasked with teaching parts of the curriculum to other research groups. The outcome of the class activity is to create the content that will be delivered by the AR applications, which will share their knowledge of these topics with users of these applications.

Research groups begin the activity by searching the web for content pertaining to the historical topics under investigation. In doing so, students can be asked to identify similarities and differences across historical artifacts and explain how these evolved from the past to the present time period.

The role of the instructor is to facilitate the search for information and to assist students in performing tasks that would be otherwise out of their reach. Sample questions for researching historical artifacts are shown below.

- What is the name of the historical artifact?
- What is the use of the historical artifact?
- How was the historical artifact made?
- Where is the historical artifact located?

Students discuss within their groups in order to formulate answers, and then share the results of their research between each groups. In doing so, each group can give an oral presentation, which is video-recorded and uploaded to YouTube. Alternatively, the teacher can provide grids to fill out, which can then be scanned and digitized as the information will serve as the content of the AR applications.

The creation of an AR application occurs at the later stages of the activity, either inside or outside the classroom, depending on the grade level of students, the availability of computers, and the time requirements. The task is meant to motivate students as their efforts results in a concrete, real-world product that can be downloaded and viewed by a broader population outside the classroom. A number of AR authoring tools have been developed for beginners in this field, and that serve to facilitate the process of creating an application.

AR Authoring tools: These tools are available to teachers to build and modify their own AR activities and can range from online platforms to downloadable free software. These tools are typically organized between object-based AR (i.e. physical objects such as QR codes in the external environment that act as cues linking to a piece of information) or location-based AR (i.e. specific locations around the classroom/city/park/etc. that are linked to a specific piece of information through their GPS location).

Object-Based AR Authoring Tools: Metaio Creator and Layar are free, object-based AR authoring tools that do not require extensive programming experience and that allows users to create and publish AR experiences. These tools allow users to load a wide range of instructional materials, including 3-D digital objects, videos, audio, pictures, links to social media sites, and webpages. Teachers can link external cues such as QR codes or 2-D images with a specific piece of instruction. These are viewed using AR Browsers that are downloaded on mobile devices, including iPad with Wi-Fi access.

Using Location-Based AR Authoring Tools: BirdsView and Hoppala are location-based AR authoring tools that allow users to publish AR scenarios. They use GPS technology to track users using and provide them with access to instructional content. Both of these

tools allows you to link points of interest on a map to instructional content (i.e. text, images, links to websites and email, as well as audio and video files). These can be viewed using AR Browsers, as discussed previously. In the case of users of BirdsView, the AR application is uploaded to their own channel, which can be accessed through the junaio application. Hoppala allows users to create their own channel, which can be uploaded through junaio or Layar.

Closing Comments: The creation of AR applications in the classroom serves to engage students in authentic learning activities that involves searching, synthesizing, and sharing information. Object-based AR applications allow users to scan external objects from inside or outside the classroom (i.e., QR codes, class pictures, musem exhibits) in order to access the relevant content. Location-based AR applications track user locations (i.e., specific locations of interest on a map of the school or heritage site) as a means to deliver information that is sensitive to the context.

As students increasingly rely on mobile devices to share and communicate with their friends, parents, and classmates, teachers can use applications as a means to better connect with their realities and provide stimulating learning experiences. This brief example of a class activity can also be adapted to student grade level and class subject-matter. Classroom instruction can target varying levels of content knowledge and search skills with the use of different pedagogical strategies. The curriculum itself is not limited to history, and can be used in other domains such as sociology. In terms of assessment practices, these can target both the process of creating the content of the application, as well as the resulting outcome. As such, the creation of AR applications stands to engage students in learning about history, and can thus serve as a useful classroom activity.

Acknowledgements: I gratefully acknowledge the revisions done to this blog post by Tara Tressel and Meredith Derian-Toth, graduate student members of the Learning Environments Across Disciplines Research Partnership. I am particularly grateful for the assistance given by Dr. Kevin Kee, Associate Vice-President Research and the Canada Research Chair in Digital Humanities at Brock University, who has advised my research in the educational implications of augmented reality. I would also like to express my very great appreciation to Dr. Aïcha Benimmas from the Université de Moncton as well as Acadian Museum curator Jeanne-Mance Cormier for their exemplary works in history education classrooms in New-Brunswick, Canada, which has served as an inspiration for writing this blog post.

This blog post is published in both *Teaching the Past: A Blog about Teaching History in Canada* as well as *Bridging the Gap*, a Learning Environments Across Disciplines research initiative headed by Tara Tressel and Meredith Derian-Toth.

Teaching Mental Processes for Deeper Learning

Tara Tressel

Unsurprisingly, traditional learning today is not situated in the same context it was long ago. Currently, students are in a classroom with 20-30+ other students, with one teacher to run the room. This is quite different than an older teaching approach: apprenticeship. In apprenticeship, the student works one-on-one with an expert who teaches the skills for a specific trade, anything from shoemaking to practicing law. Due to the intimacy of this relationship, the apprentice is able to observe the expert as they perform the tasks, usually from start to finish. Therefore, the processes involved in task completion are likely to be more tangible and clearly defined to the apprentice. This is not as easily achieved in traditional classrooms, as the student to expert ratio is high, and the material covered is different than the trade skills learned in apprenticeships. Because of this, there are elements to our classrooms that hinder the deeper learning we are now striving to achieve.

Our current system limits the learning process to a surface-learning approach, meaning that the problem solving, reading comprehension, and writing techniques that accompany deeper learning are not as apparent to learners. Several educational psychologists support the apprenticeship model for the modern classroom, with some changes. Since most learning skills we value these days embody less of the physical attributes of the past, we expand apprenticeship to address the mental process of learning; hence, cognitive apprenticeship. The goal of this teaching and learning approach is to "make thinking visible" (Collins, Brown, & Holum, 1991).

How is cognitive apprenticeship useful in the classroom? Past research shows that when solving mathematics problems, students rely on their knowledge of standard text-book examples instead of employing the problem solving techniques or looking at the inherent structure of the problem to solve the question (Schoenfeld, 1985). Because of this, students are frequently at a loss for what to do when faced with unfamiliar math problems (Collins et al., 1991). Because some students rely on pattern-recognition in solving equations instead of the problem-solving techniques used by an expert, they are unable to work through problems even when resources (like a cheat-sheet) are available to them, because they have no cognitive model to work from. This situation is not unique to mathematic problem solving. In writing tasks and reading comprehension we see this same occurrence. When given a model of effective writing, students are unable to make use of the sample for their own purposes because the techniques used to produce the text

are unknown. By making the cognitive processes of these tasks visible to the learner we can provide a learning experience that is deeper and more transferable to other tasks.

The Teacher's Role: Collins, et al., 1991 defines three main differences between traditional apprenticeship and cognitive apprenticeship. In order to translate the old model to the new model, the expert should:
1. *Clearly define the task(s), the processes involved in the task, and make it visible to learners*.
2. *Give meaning and relevance to abstract tasks by situating them in authentic contexts* (thereby providing real-world experience). In traditional apprenticeship, learning is completely situated in the workplace. In school, reading, writing, and math are not as embedded into typical daily activities of child or adult lives. Giving a solid context will motivate students to engage more fully in a task because it has relevance.
3. *Provide several opportunities to use the knowledge in varied situations so that the student can transfer what they learn to more settings*. We ask students to be able to apply the tasks they learn in school throughout their studies, whereas traditional apprenticeships do not require such skills (a shoemaker does not need to learn how to lay bricks). Today, we have needs for more generalized skills, such as effective communication and critical thinking.

What are the benefits to learning in the cognitive apprenticeship model?

- One of the biggest advantages is that students learn through practice more than they do through theory
- Through observation, a passive learner can learn to become an active learner, making the learner more capable of learning on their own
- It remains one of the best methods for acquiring and achieving expert techniques

In the classroom activities listed below, the concrete details for implementing cognitive apprenticeship is more defined.

Classroom Activities (based on Collins et al., 1991):

Kindergarden to 3rd grade: Reading & Comprehension
Using reciprocal teaching, the teacher will work individually, or in groups of up to 7 students, modeling and coaching four strategic skills: formulating questions based on the text, summarizing the text, making predictions about what will come next, and clarifying difficulties with the text.

How To:
Both student(s) and teacher read a paragraph silently. Once all members have finished reading, the teacher then models how to play the 'teacher' role (all members in the group will take turn being the 'teacher') by formulating a question based on the paragraph, constructing a summary, and finally make a prediction or clarification of the reading, if any arise. Before students take on the role of 'teacher', the teacher needs to coach students on how construct good questions and summaries. Usually this will require some prompting and constructive critiquing by the teacher.

Here's a sample of how this activity was carried out effectively in a classroom:
SAMPLE RECIPROCAL TEACHING DIALOGUE

(from Palincsar, 1986)

Text from which students are working:

Crows have another gift. They are great mimics. They can learn to talk and imitate animal sounds. Some have been known to learn 100 words and even whole phrases. They can imitate the squawk of a chicken, the whine of a dog, or the meow of a cat.

Games have a certain fascination to crows. In a game of hide and seek, a crow hides in the hollow of a tree and then sounds a distress caw. The others rush to the spot, look around, then flap away. This may be done over and over, after which the young crow pops out of its hiding place and caws gleefully. Far from being annoyed at this, the flock bursts into loud cawing themselves. They seem to like the trick that has been played on them.

T: Chantel, you're our teacher, right? Why don't you summarize first? Remember, just tell me the most important parts.

S1: Crows have a hundred words they can learn by imitation. They can imitate chickens, the whine of a dog, and cats.

T: Okay. We can shorten that summary a bit.

S2: You could say they can imitate other animals.

T: Oh! Good one! There's a list there, Chantel, did you notice that? It says they can imitate the squawk of a chicken, the whine of a dog or the meow of a cat; and you could call that "animal sounds." Can you ask us a question?

S1: Ain't no questions in here.

S3: The words (sic) that need to be clarified are (sic) "mimics."

S4: That means imitate, right?

T: Right. How did you figure that out, Shirley?

S4: The paragraph. - 5 -

T: Show us how somebody could figure out what "mimic" means.

S5: They are great mimics. They can learn to talk and imitate animal sounds.

T: Yes, so the next sentence tells you what it means. Very good, anything else needs to be clarified?

All: No.

T: What about that question we need to ask? (pause) What is the second paragraph about, Chantel?

S1: The games they play.

S3: They do things like people do.

S4: What kinds of games do crows play?

S3: Hide and seek. Over and over again.

T: You know what, Larry? That was a real good comparison. One excellent question could be, "How are crows like people?"

S4: They play hide and seek.

T: Good. Any other questions there?

S2: How come the crows don't get annoyed?

S5: Because they like it, they have fun. If I had a crow, I'd tell him he was it and see what he'd do.

T: Let's summarize now and have some predictions.

S1: This was about how they play around in games.

T: Good for you. That's it. Predictions anyone?
S2: Maybe more tricks they play.
S4: Other games.
T: Maybe. So far, they have told us several ways that crows are very smart; they can communicate with one another, they can imitate many sounds, and they play games. Maybe we will read about another way in which they are smart. Who will be the next teacher?

4th grade through High school: Writing Prompts

This activity provides explicit procedural supports (in the form of prompts) of how to develop more sophisticated writing strategies. To do this, researchers detailed the cognitive processes of expert writers in five goals: "1) generate a new idea, 2) improve an existing idea, 3) elaborate on an idea, 4) identify goals, and 5) putting ideas into a cohesive whole" (Scardamalia and Bereiter, 1983, 1985). Here's the list of suggestions for the prompts:

PLANNING CUES FOR OPINION ESSAYS
(From Scardamalia eta[, 1984)
NEW IDEA
An even better idea is ...
An important point I haven't considered yet is ...
A better argument would be ...
A different aspect would be ...
A whole new way to think of this topic is ...
No one will have thought of ...
IMPROVE
I'm not being very clear about what I just said so ...
I could make my main point clearer ...
A criticism I should deal with in my paper is ...
I really think this isn't necessary because ...
I'm getting off the topic so ...
This isn't very convincing because ...
But many readers won't agree that ...
To liven this up I'll ...
ELABORATE
An example of this. .
This is true, but it's not sufficient so ...
My own feelings about this are ...
I'll change this a little by ...
The reason I think so ...
Another reason that's good ...
I could develop this idea by adding ...
Another way to put it would be ...
A good point on the other side of the argument is ...
GOALS
A goal I think I could write to ...
My purpose ...
PUTTING IT TOGETHER

If I want to start off with my strongest idea, I'll ...
I can tie this together by ...
My main point is ...

The next step is to illustrate how to use these prompts to the students. Since this is a skill you want students to develop over time, a great option is to video record yourself doing a *think aloud* (hyperlink/dictionary) as you go through the process, holding up cue cards with the 5 goals as you go through each step. If you prefer to keep yourself out of the video, just keep the screen blank (or spice it up with relevant pictures) but make sure that there is a visual representation on the screen when you reach one of the five goals, so that students can really see how and when you got to each step. If you wish to take this further, you can have your students video record themselves going through the same process, doing this throughout the school year and archiving each videos for the students to use as self-analysis to mark their progress. Eventually, students will become familiar with the process and not rely on the cues!
Youtube is an excellent source for making and sharing videos. Follow this link to see how-to http://www.youtube.com/teachers

A TEACHER MODELS HOW TO GET STARTED
ASSIGNMENT
(Suggested by students)
Write an essay on the topic "Today's Rock Stars Are More Talented than Musicians of Long Ago.'

THINKING-ALOUD EXCERPT
I don't know a thing about modern rock stars. I can't think of the name of even one rock star. How about, David Bowie or Mick Jagger ... <u>But many readers won't agree</u> that they are modern rock stars. I think they're both as old as I am. Let's see, <u>my own feelings about this are ... that</u> I doubt if today's rock stars are more talented than ever. Anyhow, how would I know? I can't argue this ... <u>I need a new idea</u> ... <u>An important point I haven't considered yet is</u> ... ah ... well ... what do we mean by talent? Am I talking about musical talent or ability to entertain-to do acrobatics? Hey, I may have a way into this topic. <u>I could develop this idea by</u> ...
*<u>Underline</u> represents planning cues
Researchers:
Collins, A., Brown, J. S., & Holum, A. (1991). Cognitive apprenticeship: Making thinking visible. American Educator, 6(11), 38-46

Retrain Your Brain
Sonia Rahimi & Kyle Hubbard

Teachers are faced with the stress of dealing with parents, un-cooperative students, school board demands, and not enough time in the day to meet classroom needs. Not surprisingly, teachers are leaving the occupation more frequently than ever before, with

an estimated *40% of teachers leaving within the first five years* (Roness, 2011). The reason these teachers are leaving is generally because they are burned out.

What is burnout: Feelings of burnout arise when teachers feel as though they are unable to cope with the demands of their work (Schwarzer & Hallum, 2008). A potential relief from feelings of burnout is possible if teachers are able to view their feelings of stress and burnout as something controllable.

How to prevent burnout: Perceived control can be described as an individuals' beliefs of whether they possess certain attributes (i.e. intellectual ability, effort expenditure, task strategies, etc…) and whether those attributes affect their academic performance" (Perry et al., 2005, p. 365). Students with low perceived control have been found to have low motivation, recurrent failure experiences, and negative affect (Perry, 1991, 2003). Conversely, possessing high perceived control can be extremely beneficial.

According to Weiner's Attribution Theory (1974, 1985, 1995, 2006), an individual will aim to explain causes for failures as (a) internal or external to the individual, (b) stable or unstable over time, and (c) personally controllable or uncontrollable. Students who adopt controllable attributions are assumed to feel better, work harder, and obtain higher grades due to the fact that they tend to believe they can improve while assuming responsibility for themselves. And when a teacher attributes negative outcomes to uncontrollable causes, they will likely feel more negative emotions. For example, a teacher who believes that their stress is due to having too many students placed in their class will likely experience feelings of helplessness and shame. The way in which teachers attribute failures in their students determines subsequent goals, intentions to assist their students, perceptions of self-efficacy, and emotional experiences (Reyna & Weiner, 2001).

Attributional Retraining: Attributional retraining (AR) is one example in which participants are informed about the benefits of adopting personally controllable, causal attributions as opposed to uncontrollable, maladaptive attributions following poor performance. In a study by Rahimi, Wang & Hall, researchers found that teachers that make controllable attributions were more likely to exhibit positive emotions (enjoyment) and lower negative emotions (anxiety and anger). Furthermore, teachers that had more positive emotions were more likely to be satisfied with their jobs and displayed lower levels of burnout and intentions to quit their job.

AR interventions have been successfully used with elementary and high school students to increase motivation and improve performance (for a review see Perry & Hall, 2009). Among younger students, the focus of the attributional content tends to be on reiterating the benefits of effort (e.g., Schunk, 1983) or highlighting a lack of effort as the cause behind poor performance (e.g., Dweck, 1975). In high school, AR has been shown to improve motivation, performance, and perceived control with typical students (e.g., Dresel, 2000) and those who have been classified as gifted (e.g., Zeigler & Heller, 2000). Additionally, AR has been used in special education settings for students with learning disabilities (e.g., Shunk & Cox, 1986) and to improve aggressive behaviour (e.g., Hudley et al., 1998) and group discipline issues in school (e.g., Lapointe & Legault, 2004).

Ongoing research has consistently shown how AR helps students protect their motivational resources, persist in the face of failure, and make modest improvements in their academic performance ranging from test scores to cumulative GPAs (for reviews see Forsterling, 1985; Haynes et al., 2009; Perry et al., 1993; Wilson et al., 2002).

Attribution-based In-class Activity

Instructions for Teachers

Prior to providing the attributional retraining exercise, it is important to prime the students to begin thinking about the attributions or causes behind their academic performance, good or bad. One method for accomplishing this is to create an interactive survey in which the results are presented in a visually engaging real-time format. To do this you will need to visit www.polleverywhere.com.

Through Poll Everywhere, you can create multi-question surveys where students respond to each question by texting their answers with a mobile phone, twitter, or through their web browser. The responses are then instantly displayed with the poll question and can be projected via the web or Powerpoint for the whole class to see and discuss.

The Poll Everywhere program is free if there are less than 40 students responding to the survey, it has been designed to be extremely user-friendly, and there are excellent tutorials to guide you through the survey creation and implementation. Below are a few recommended questions to help get you started, however, we encourage you to expand the activity as you see fit (these questions can be altered depending on the students' grade level).

Sample Poll Questions

Q: When a student performs poorly on a test or assignment, what is the main cause?
- A- They didn't pay attention in class
- B- They didn't study hard enough
- C- They have a bad teacher
- D- The test or assignment was too hard
- E- They aren't smart enough

Q: If you've ever had a bad grade in school, what did you do?
- A- Give up
- B- Study harder
- C- Ask the teacher for extra help
- D- Complain
- E- Pay better attention in class

Q: What do you think is the best way to get higher marks in class?
- A- Pay better attention in class
- B- Make a new study strategy

C- Ask for extra help from your teachers and parents/guardians
D- Cheat
E- Get help from a friend

Q: When you don't do as well as you expected in class, how does it make you feel?
A- Sad
B- Angry
C- Unlucky
D- Hopeless
E- Guilty

Once the survey has been completed and the students are engaged, the attributional retraining exercise can be administered. A script for running the activity, the accompanying instructions (see the italics in the brackets), and the actual materials are provided below.

Instructions for the Students:

"The following activity has two parts. Part 1 involves reading through a series of statements typically made by students when discussing their school experiences. In Part 2, you will be required to complete a few questions to test your memory, understanding, and opinions about this information." (*Teacher then presents Part 1 and discusses with the class. Teachers can choose how they wish to present the information, i.e., personal computers, iPads, projector, etc.*)

"Now, for Part 2, you will be asked a few questions about what you remember from Part 1. These questions also ask you to think about your own school experiences and how the information presented in Part 1 may apply to the way you approach your studies. Please try to be as honest and descriptive as possible when responding." (*Teacher then presents Question 1. Once again, it is up to the teacher on how they wish to present the questions and have students complete them. Teachers can also choose how long students will have for each question depending on their current level/abilities. When the time is up, the next question is presented. Alternatively, teachers may present all four questions at once, depending on their preference.*)

Following the completion of all four questions- "As you may recall from the information presented in Part 1, students often attribute poor performance to a lack of ability which can lead to lower motivation and future course performance. Research shows that encouraging students to view their performance as largely due to their persistence and effort (studying better, taking notes in class, etc.) leads to students feeling more motivated and performing significantly better in the future (e.g., from a B to B+ in year-end grades). In answering the previous set of questions, hopefully you were able to relate these principles to your own school experiences." (*Teachers can then present Part 1 once more and discuss with the students if they wish*)

PART 1

Didn't do as well on a test as you wanted?
Feeling frustrated, depressed, angry?

Here are some suggestions as to how you can change the way you *think* about negative experiences in your life:

Rather than thinking . . .	**Instead . . .**
• I'm stupid.	• Everybody can succeed - you just have to work at it. Here are some examples as to how you can study more effectively: - read chapters several times - review notes several times - use your study guide - study with someone
• The test was too difficult.	• Tests can appear difficult when you're not well enough prepared. Study more for the next test.
• I have a bad teacher.	• If you are having problems with a teacher, talk to him or her about your difficulties. If that doesn't help, you may have to work extra hard to do well in the course.
• I had a bad day.	• We all have bad days once in a while, but make sure that you study enough for the next test to improve your grade.
• I panicked.	• If you have a problem with test anxiety, try to relax under stress.

The next time you don't do as well on a test or assignment as you wanted, remember that most reasons for doing poorly are under your control and can be changed.

PART 2

QUESTION 1 of 4:
Discuss and summarize the main points of the information you read in your own words.

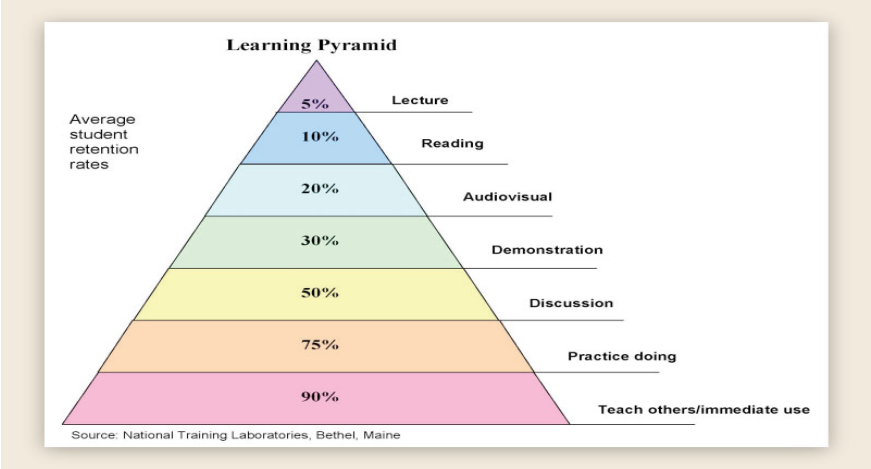
QUESTION 2 of 4:
Discuss and describe several important and controllable reasons for why students may not perform as well as they could in their courses. Provide an example of each.

QUESTION 3 of 4:
Try to recall a recent instance where you performed poorly, or didn't perform as well as expected, on an important test or assignment. Discuss as openly and honestly as you can how the event made you feel.

QUESTION 4 of 4:
Describe as many examples as possible of how you could apply the main points of the information you read to the way you currently approach your school courses.

Teaching Others Improves Learning

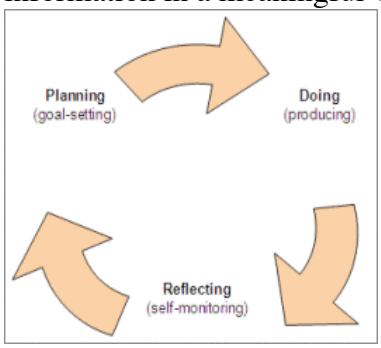
Cynthia Psaradellis



If you could choose the way you've been taught, would you choose to attend a lecture, read about it, take part in a group discussion, or teach someone else? According to the National Training Laboratories in Maine, if you choose a passive way of learning such as lecture, reading, audiovisual, or demonstration, you will only remember 5-30% of information. If you choose an active way of learning such as discussion or practice doing what you learn, you will remember 50-75%. If you choose teaching someone else, you will remember 90% of information. Similarly, an ancient Chinese proverb by Confucius states that "I hear and I forget. I see and I remember. I do and I understand". This blog focuses on *learning by teaching*, which has shown to *improve* students' *self-regulation* strategies, the *value* students put on a task, the perceived *control* a student has over the

success of pursuing a task, the positive and negative *emotions* students feel, as well as academic *achievement*.

"Learning by teaching" can be defined as learning in the process of either teaching a peer (Roscoe and Chi, 2007), preparing to teach (Fiorella and Mayer, 2013), or teaching a computer agent **dictionary?**(Biswas et al., 2010). According to previous research, *learning by teaching is an effective to enhance learning* (Roscoe & Chi, 2007). The reason why learning by teaching improves learning is still unclear. Some may argue that students learning by teaching others choose relevant information, which supports learning (Roscoe and Chi, 2007). Others argue students who learn by teaching organize information in a meaningful way which improves learning (Roscoe and Chi, 2007).



According to Pekrun's (2006) article,

- High Task Value & High Perceived Control → Enjoy (+ Emotion) → Increases Learning
- Low Task Value → Bored (- Emotion) → Decreases Learning

In other words, if students value a task and perceive that they have control over their success, they are more likely to enjoy the task and learn more from it. While there has been extensive research on "self-regulatory learning" and the relationship between task value and emotions, the majority of these studies have not focused on a learning by teaching context. Our research (Muis, Lajoie, Psaradellis, Chevrier, & Derian-Toth, submitted to conferences), focuses on why learning by teaching improves learning by studying self-regulated learning, emotions, value, and achievement in a learning by teaching context.

- According to our research, students who learn by teaching have higher levels of monitoring for learning, higher task value, higher perceived control, lower levels of negative emotions such as confusion and frustration, and higher grades.

Therefore, students enjoy the learning process and learned more compared to students who did not approach a task with the intention of teaching it.

Classroom Activity:

Making a difference one student at a time with **Doodle Cast**

http://doodlecastpro.com/

In order to profit from the benefits demonstrated by the learning by teaching research, a learning environment can be created in which students of all grade levels use an iPad application, such as Doodle Cast, to record a video.

- After students finish working on a problem or task in class (such as a mathematics equation), students are instructed to make a video teaching a peer how to perform the given task.
- Using Doodle Cast to record videos is as simple as pressing record on the button in the top centre of the screen.
- For teaching purposes, students will state the problem and explain how to solve the problem.
- According to learning by teaching theory, students who will teach someone else will also learn in the process. The video is not necessary for deep learning to occur, the aspect to emphasize is teaching, regardless of the medium.

This learning by teaching task can be applied in any discipline, at any grade level, it is just an extra step added onto an already existing task.

References:

Learning by teaching: teaching someone else and learning in the process (Biswas et al., 2010)

Biswas, G., Jeong, H., Kinnenbrew, J. S., Sulcer, B., & Roscoe, R. (2010). Measuring self-regulated learning skills through social interactions in a teachable agent environment.

Research and Practice in Technology Enhanced Learning, *5*, 123-152.

Self-regulated learning: planning, monitoring, strategy use, and reflection (Azevedo, 2005)

Azevedo, R. (2005). Computers as metacognitive tools for enhancing learning. *Educational Psychologist, 40*(4), 193–197.

APPENDIX F

Vicarious Experience Comments

Stealth Assessment:
I have been teaching 6th grade science for over 10 years and love using games to accentuate learning. Students really loved this game and I will definitely be using it again as an activity. I don't have a classroom full of computers, but there is a computer lab in our library that I booked to have my students try this out. I downloaded Newton's Playground at home to test it out first, but since I have a macbook I had to download WineBottle to run the .exe file. This was pretty easy, there's a decent video on how to do it: http://www.youtube.com/watch?v=eYISVQBBkJI (for the WineBottle program, look to the links in the description under the youtube video). For the school computers, since they are Dells, it took a matter of minutes to click on the download link and get the program up and running. The first thing NP asks for is a LogIn ID so be prepared for that if you don't get a chance to test the program out before using it in the classroom.

Situational and Individual Interest:
I decided to give Smithsonian Quests a try for my fourth grade classroom because I wanted something versatile that could be used for all subjects that also incorporated technology. There has been minimal work on my end to set this up- I spent an evening going through the different activities and identified which ones overlapped with our syllabus. In class, I had students set up user names and sign in (I helped- took just a few minutes tops) http://shout.smithsonianquests.org. So far, there have been no weird 'bugs' with the program, and the students and I are really enjoying this format for in-class and take-home assignments when it fits with our schedule. I use the '4th grade page' under 'My Groups' to view assignments (under the 'Submissions'), and I am experimenting with the 'Forum' to see if students will use it to post questions or answers on the activities. I've found this to be a really comprehensive, free program that saves me work in creating interesting activities and is fun for the students.

Hybrid Learning:
I am a 6th grade life science teacher and I've heard about hybrid learning through my son, currently in an online and in-person undergraduate chemistry class. I then attempted to turn my life science class hybrid! The first hybrid activity we did was use Google+ to hang out with a PhD student currently doing research on the life cycle of owls. He was very knowledgeable and answered all of the students' questions. I also thought it would be beneficial to record the hangout using the YouTube feature. The students could then use the video on their exam, as all of our tests are open-resource. I really enjoyed incorporating an online component into the class and I am really looking forward to our Google Hangout with a scientist at the planetarium next week!

Argumentation:
For my 9th grade English class we read "To Kill a Mockingbird" and I wanted to take a different approach than I had before while still focusing on the racism theme. We took a close look into stereotypes and how they can form from misconceptions. I wanted to

incorporate some ed tech into the assignment because I keep hearing how much the students are motivated to use it. The students first chose common misconceptions that have formed into stereotypes and then interviewed their peers about it. The students then chose how they would record the interviews, edit them together, and then share with the public. Most student's took videos of their interviews with peers from their iphone, created a video using imovie then shared it as a link on a wiki page with an explanation of the misconception. The students had so much fun creating their videos and

Learning by Teaching:

I also used technology in my political science high school class to try out the learning by teaching method. We actually used the computers in our school's computer lab because the school Ipads were already in use. Our computers run on windows so I had the students use window movie maker, but for macs you can use imovie. This was actually my first time with the video-editing software, but it was surprisingly easy to learn and user friendly. We were studying the stock market and I instructed the students to make an introductory video for someone who is interested in investing but doesn't know too much about the fluctuation of the market. The students responded really well, both enjoying the task of making a movie as well as scoring better on that portion of the exam.