Annotated Bibliography

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Baran, E. (2014). A review of research on mobile learning in teacher education.*Journal of Educational Technology & Society, 17*(4), 17-32.

The author presents research on utilizing mobile learning to support teacher development and training. Existing literature was synthesized over quantitative and qualitative research regarding mobile learning. The synthesized research shows that interest in mobile technology is heavily increasing and survey studies revealed various results regarding perceptions, attitudes and usage about mobile learning. The literature generally considered mobile learning to be beneficial to teachers by improving their technology integration skills, connecting learning to the community, providing personalized learning experiences, presenting alternative assessment techniques, and enhancing social interaction. The literature review also shows how mobile learning extends to having positive outcomes for teachers to understand and develop authentic and higher order lessons. The research investigates the challenges of mobile technology including ethical issues, lack of support, equitable access, experience, mobile bans, and curriculum adaptations. Finally, the research presents pedagogical affordances that support mobile learning in teacher education settings.

The study presents recommendations on how teacher leaders and administrators can use mobile learning to support professional development. Moreover, The research supports mobile learning as an engaging way to support teachers in developing and creating academically challenging and authentic classrooms. This review is quite extensive and examines a large variety of research regarding mobile learning, which makes this source very beneficial. However, the author does not provide many strategies to apply mobile learning to teacher development and practice.

Booth, J. (2008). *The influence of professional development in technology integration on teacher pedagogy and student engagement in fourth and fifth grade elementary classrooms in an urban elementary school in the northeast*(Ed.D.). Available from ProQuest Education Journals. (230711652).

This study explores professional development regarding technology integration to support student engagement and achievement as well as teacher attitudes in two urban schools. Both schools were provided adequate technology but only one was provided with technology integration professional development. Writing skills and problem solving were both measured as areas of achievement. The results showed that the school that was offered the professional learning outperformed the school that was not offered the professional learning in both writing skills and problem solving. Booth concluded that technology alone is not the sole success of student achievement but the way that it is implemented along with professional development creates a larger effect. The study also shows that there was no difference from pre to post questionnaires in the areas of teacher attitude/beliefs and teacher implementation and professional development. However, there was a significant increase in teacher confidence when it comes to integrating technology into the classroom.

This study does a god job at detailing the methodologies and recommendations that need to be taken in order to make the study more effective. The document supports technology integration as a way to increase academic achievement and student engagement. However, the research does not support the positive effect of technology when it comes to the attitudes of teachers. The limited timeframe of this study discourages the adoption of technology integration by teachers. Therefore on-going professional learning is recommended by the author along with ongoing support and modeling from leaders.

Christensen, R. (2002). Effects of technology integration education on the attitudes of teachers and students.*Journal of Research on Technology in Education, 34*(4), 411-433.

Christensen investigates the effect of technology education and the attitudes of teachers and students by generating a six-stage adoption model. This study examines three hypotheses that focus on how needs-based technology integration affects the attitudes of teachers and students in conjunction with professional learning. Data was collected by examining the results from one K-5 treatment site and two comparable schools over one school year. Several questionnaires were used as the primary assessment tool and covered everything from emotions that were related to using technology such as anxiety and enthusiasm to skill checklists. The results of this study indicate that technology integration education strongly influences teacher and student attitudes towards technology. Most of the teachers that were used for this study moved to the higher stages of technology adoption. Trainings appear to foster teacher knowledge, which then generates a meaningful and positive relationship between the stakeholders and technology integration. However, the more important that technology becomes to students the more anxiety teachers experience. As a result, it is implied that teachers need more professional training and support, for example to help smooth out anxiety levels. Findings support that the importance of on-going professional learning is critical for technology to increase student achievement.

The data that was collected in this article is significant because it shows how teachers and students adopt technology when professional learning is present and ongoing. Though the research was conducted several years ago, it still makes valid claims on how to move teachers through the stages of adoption.

Delacruz, S. (2014). Using nearpod in elementary guided reading groups.*Techtrends, 58*(5), 62-69. doi:[http://dx.doi.org.proxy.kennesaw.edu/10.1007/s11528-014-0787-9](http://dx.doi.org.proxy.kennesaw.edu/10.1007/s11528-014-0787-9" \t "_blank)

Delacruz investigates the use of iPads and the application Nearpod in a fourth grade classroom. This study examines the effect that Nearpod has on guided reading instruction. Quantitative data sources collected included teacher and student video journals, interviews and works samples as well as quiz results from the application itself. The application allows for teachers to prepare lessons, presentations and assessments through the Nearpod application in order to explicitly teach vocabulary, comprehension, literary elements, and fluency. All students who piloted this study preferred to use Nearpod for guided reading instruction as opposed to traditional guided reading methods. The author indicates Nearpod allows students to tune into their particular learning style. Additionally, real time results allow the teacher to quickly access students and provide immediate feedback and support. Challenges of the application included troubleshooting issues as well as the cost of the application.

The application seems to mainly support student engagement, as there are no specific results on student achievement. Results were not compared to a focus group that uses a traditional guided reading method. However, results indicate that Nearpod highly engages students and is very useful as an assessment tool. This research supports Nearpod as an engagement tool that could be used beyond guided reading and into other content areas. It also has potential to increase student achievement but further research would need to be conducted.

Edens, K., & Potter, E. (2007). The relationship of drawing and mathematical problem solving: Draw for math tasks.*Studies in Art Education, 48*(3), 282-298.

This study investigates the relationship between students’ spatial understanding and mathematical problem solving. It also aims to determine the type of drawings the child creates as either schematic or non-schematic and how it is related to mathematical problem solving. This research was conducted in an elementary art classroom with fourth and fifth students who were given several drawing and problem solving tasks to complete. Results indicate that a significant correlation was found between spatial understanding and problem solving. The importance of this is that teachers can assist their students with problem solving by understanding their spatial awareness. It also shows that artistic ability supports mathematical understanding by helping students develop spatial skills and proportional thinking.

The research indicated in this study does not offer any strategies to increase or support the transfer of math problem solving to spatial thinking or vice versa. The research also does not offer any strategies to help connect both mathematical and spatial thinking to technology. However, the significant relationship between both domains supports many current practices for mathematical education. Many teachers encourage their students to draw and represent key components when they problem solve. The author states that spatial understanding plays a role in unpacking the structure of math problems and helps lay a foundation for its solution.

Franklin, T., & Peng, L. (2008). Mobile math: Math educators and students engage in mobile learning.*Journal of Computing in Higher Education, 20*(2), 69-80. doi:[http://dx.doi.org.proxy.kennesaw.edu/10.1007/s12528-008-9005-0](http://dx.doi.org.proxy.kennesaw.edu/10.1007/s12528-008-9005-0" \t "_blank)

The research presented in this study investigates how mobile learning effects students understanding of math concepts. Two eighth grade classrooms were given iPod touches to generate math lesson to be recorded in a video format using a variety of software and applications. Students were allowed to take the mobile technology home to further develop these lessons. Both teachers were given extensive training on how to use and integrate technology into the curriculum. Findings from this study indicate that both teachers and students were positively affected by the use of mobile technology in math. Students were excited to use a technology format to learn math concepts and were challenged to organize and create lessons that would be used to teach other students, making the learning experience more authentic. Qualitative data was used to access these outcomes.

Results indicated several strengths including the ability of students working together as well as independently, the narrowed gap between students with disabilities, and the ability to use the technology in the home. During the implementation phase of this study there were several interruptions that could have negatively impacted the results of this investigation. Though the learning outcomes were not measured, administrators and teachers could tell a significant increase in the understanding of math concepts. With further research it is plausible that the videos created could increase learning outcomes in regards to math concepts.

Kiger, D., Herro, D., & Prunty, D. (2012). Examining the influence of a mobile learning intervention on third grade math achievement.*Journal of Research on Technology in Education, 45*(1), 61-82.

In this nine-week study, four third grade classrooms were compared to the effects of mobile learning on math achievement. Two classrooms were tasked with using everyday math techniques such as worksheets and flashcards to learn multiplication. The other two classrooms used web applications for daily practice. Students were given ten minutes daily to practice multiplication. Students who participated in the mobile learning intervention were directed to which math applications to use and were also given a choice. A pre and post intervention multiplication test was administered including both single and double multiplication. Student’s attitudes, effort, and absences were also measured throughout the nine weeks. Results of this study indicate that students who participated in the mobile learning intervention out performed the comparison group on average.

This study has many strengths due the amount of controls and variables that were used throughout the process. Advanced teacher training is also a key factor in the strengths of this study in order to level out any gaps including professional knowledge. Weakness of this study include the short time frame, the high number of students who had technology to practice multiplication at home, and the teacher’s role of how instruction was presented in the classroom was not a study focus. Moreover, the study does not focus on the effects that mobile technology has on higher order thinking. The study focuses on more skill and drill type practices.

Pareto, L., Haake, M., Lindström, P., Sjödén, B., & Gulz, A. (2012). A teachable-agent-based game affording collaboration and competition: Evaluating math comprehension and motivation.*Educational Technology, Research and Development, 60*(5), 723-751. doi:[http://dx.doi.org.proxy.kennesaw.edu/10.1007/s11423-012-9246-5](http://dx.doi.org.proxy.kennesaw.edu/10.1007/s11423-012-9246-5" \t "_blank)

In this study, research’s set out to determine the relationship between game based learning along with collaboration and competition in order to improve student achievement and attitude towards math. Two third grade classrooms participated in the study whereas one was used as a control group. In the game based classroom students were tasked with playing games that supported several different math concepts. Students worked in collaborative groups (pairs vs. pairs) as well as competitive groups (one-on-one) to master the math concepts and win the game. Upon conclusion of the study, evidence showed that students who participated in the game based environment scored significantly higher on posttest data than the control group. Researchers hypothesize that the engagement of the game itself increased the motivation and learning outcomes of the experiment. In addition, students who participated in the collaborative group setting scored higher than those in the competitive group setting. It is believed that the reason for the collaborative groups success rate is due to the opportunity of students to discuss and strategize with a partner. However, despite this success in student achievement, the overall attitude towards math was minimally increased.

The main strengths of this study include a propensity towards encouraging collaborative learning in the area of mathematics as well as using game based learning to motivate and engage students. However, the limited time frame of this study and the lack of change in student attitudes proved to be the biggest weaknesses. The research from this study can further be used to support student collaborative models as well as game based learning.

Schwartz, C. S. (2012). Counting to 20: Online implementation of a face-to-face, elementary mathematics methods problem-solving activity.*Techtrends, 56*(1), 34-39. doi:[http://dx.doi.org.proxy.kennesaw.edu/10.1007/s11528-011-0551-3](http://dx.doi.org.proxy.kennesaw.edu/10.1007/s11528-011-0551-3" \t "_blank)

The purpose of this study was to demine the relationship between face-to-face and online learning when it comes to mathematical problem solving. Two classrooms, one face-to-face and one online, were tasked with playing a problem solving game called “I Can Count to 20”. Both learning environments were controlled by the same teacher to level out any instructional gaps between classrooms. Qualitative data was collected through classroom observations and mathematical journals from students. Findings show that both environments have certain strengths and weaknesses. Online students were more detailed in their representations while face-to-face students had more opportunities to discuss decision-making. Moreover, the pacing in the face-to-face setting allowed students to continuously generate mathematical language and skills. Whereas the online environment allowed students to discuss their thinking in a written format, which provided more detailed mathematical rational.

Several questions were considered after the completion of this study including: How can face-to-face environments allow students to more thoroughly express their mathematical thinking? How can students in an online environment work collaboratively to help move pedagogical thinking forward? Though no data was collected to support either environment the research could be used to determine strategies on how to blend the face-to-face and online environment. The study can also inform educators about the strengths and weaknesses of both learning environments.

Zhang, M., Trussell, R. P., Gallegos, B., & Asam, R. R. (2015). Using math apps for improving student learning: An exploratory study in an inclusive fourth grade classroom.*Techtrends, 59*(2), 32-39. doi:[http://dx.doi.org.proxy.kennesaw.edu/10.1007/s11528-015-0837-y](http://dx.doi.org.proxy.kennesaw.edu/10.1007/s11528-015-0837-y" \t "_blank)

The purpose of the study was to determine the relationship between math applications and student achievement in an inclusive classroom. One fourth grade classroom consisting of mostly students with disabilities and at-risk students participated in four 80 – 90 minute sessions where they used math applications that covered fourth grade math standards. A pre and post assessment was given each session with questions similar to the application that students were using. Data was collected over the following subgroups: all students, typical students and struggling students. The results concluded that students improved their performance from pre to post test after using each of the math applications. Moreover, the data indicates that the achievement gap between the typical and struggling students was narrowed even though the typical students still outperformed the struggling students. The struggling students made larger gains throughout the assessments.

This study indicates that math applications improve student achievement and may be used as an intervention for struggling students. The author mentions how math applications allow struggling students the opportunity to self-pace, receive immediate feedback, and break down processes into smaller steps. The teacher can also access data for each student and track progress in order to further support students in a timelier manner. The author also mentions how math applications allow students to receive more practice problems than a typical pencil and paper assessment. Though this research is useful it does not provide a control group or other outlaying variables that may affect the results. The data presented in this study is also limited to a small sample size.