

Bethel University

Spark

All Electronic Theses and Dissertations

2023

Advancing Student Achievement With Technology

Alec J Herbst
Bethel University

Follow this and additional works at: <https://spark.bethel.edu/etd>

Recommended Citation

Herbst, A. (2023). *Advancing Student Achievement With Technology* [Master's thesis, Bethel University]. Spark Repository. <https://spark.bethel.edu/etd/1021>

This Master's thesis is brought to you for free and open access by Spark. It has been accepted for inclusion in All Electronic Theses and Dissertations by an authorized administrator of Spark. For more information, please contact lfinifro@bethel.edu.

ADVANCING STUDENT ACHIEVEMENT WITH TECHNOLOGY

A MASTER'S THESIS

SUBMITTED TO THE FACULTY

OF BETHEL UNIVERSITY

BY

ALEC J. HERBST

IN PARTIAL FULFILLMENT

FOR THE DEGREE OF

MASTER OF ARTS IN TEACHING

AUGUST 2023

BETHEL UNIVERSITY

ADVANCING STUDENT ACHIEVEMENT WITH TECHNOLOGY

Alec J. Herbst

August 2023

APPROVED

Program Director & Thesis Advisor: Molly J. Wickam, MBA, Ph.D.

Abstract

This thesis identifies how teachers can manage the safe and responsible use of electronic technology resources in the classroom while influencing students to practice the same behaviors outside of school. A review of the literature using Self Determination Theory (Deci & Ryan, 2012) as a framework focuses on technology-based pedagogy, classroom management, and technology use at home. How effectively teachers manage technology in their classrooms can greatly determine the overall knowledge students retain. Technology can motivate students to engage in learning. Teachers are expected to be leaders in modeling the responsible use of new digital tools that can expand learning possibilities. The more teachers institute technology expectations in class, the more likely students will follow similar principles at home. Teachers and parents can impact students more by providing aligned expectations. All parties are responsible for intertwining technology with education standards including administration, teachers, parents, and students.

Table of Contents

Abstract	2
Table of Contents	3
Chapter I: Introduction	5
Research Rationale	7
Definition of Terms	10
Guiding Questions	12
Chapter II: Literature Review	13
Technology-Based Pedagogy	14
School-Assigned Devices	14
Monitoring Student Engagement	15
Digital Tools	18
Digital Safety	23
Teacher Training and Collaboration	25
Disparity of Resources	30
Social Media	32
Learning Management Systems	33
Mobile Applications	36
Student-Centered Technologies	38
Student Motivation	41
Classroom Management	43

Managing Behavior	43
Cyberbullying	45
Cell Phone Usage	46
Perception of Integrating Technology	49
Technology Use at Home	50
Consistent Expectations	50
Digital Literacy	51
Problematic Behavior	55
Social Media Restrictions	57
Flipped Classroom Method	57
Chapter III: Discussion and Conclusion	60
Professional Application	64
Limitations of the Research	68
Implications for Future Research	69
Conclusion	70
References	72

CHAPTER I: INTRODUCTION

The importance of including electronic technology in daily classroom activities continues to grow each year as a need to keep up with the changing norms of society. Teachers have been tasked with using various online tools that present opportunities to enhance lessons. Schools are renting out valuable technological devices to give students the capability to connect with education through relevant means. During the 2019-2020 school year, 45% of 800 public schools in the 50 states and District of Columbia reported providing a computer for each student (Gray & Lewis, 2021). Due to the increase of students' availability to use computers on a daily basis, there is a need for teachers to be willing to learn new programs and technologies that could enhance students' learning.

Teachers have shown the ability to grow with technology in recent years. They were forced to adapt to online education due to the outbreak of the COVID-19 pandemic, which brought many obstacles to learning. The inconsistent and uneven outcomes of technology were brought into greater focus (Facer & Selwyn, 2021). Technological developments like digital cameras, projectors, mind training software, computers, PowerPoint presentations, and 3D visualization tools have become great sources for teachers to help students grasp a concept easily (Raja & Nagasubramani, 2018). From writing an essay in English class to 3D modeling in mechanics courses, students find themselves using technology all day. Dawson et al. (2008) and Gilakjani (2014) believed using technology can create a learning atmosphere centered around the learner rather than the teacher, which in turn creates positive changes. Technology can put learning in the hands of the student as many activities depend on their interaction.

School-owned devices are not the only technologies in classrooms, as cell phones have proven to be a constant irritant for teachers trying to maintain control of their students' engagement. It was shown "it is more likely a student who uses less his or her cell phone will have a higher G-MNPS than the student who uses their cell phone more, given an equal performance in the college's entrance exam and the same belief to self-regulate their own studying settings" (Felisoni & Godoi, 2018, p. 11). Beland and Murphy's study (2016) found that banning cell phones improved outcomes for low-achieving students the most (14.23% of a standard deviation) and had no significant impact on high achievers.

Many researchers have attempted to uncover just how distracting cell phones can be for students' learning capabilities in hopes of answering the question of whether a phone ban is necessary for students to perform to their full potential. Felisoni and Godoi (2018) conducted an experiment to test the relationship between average time spent on smartphones on a daily basis and academic performance. Despite the set of learning-efficient tools available in current smartphones, these devices are more often a source of distraction in classrooms and any other setting dedicated to studying, rather than a productive platform to find and share information, exercise new learnings, and interact with students or professors. Students have shown tremendous improvement in their grades in classrooms that have banned cell phones completely (Beland & Murphy, 2016).

Schools have weighed the pros and cons of utilizing technology in classrooms, and have found technology can effectively manage students' progress toward learning outcomes. Teachers can utilize technology as part of their pedagogy as long as it is useful and they maintain effective instructional practices regardless of possible distractions. Teachers are

tasked with using technology to help manage behavioral concerns in their classrooms as well. Schools use data that has been collected from surveilling students' monitoring school-issued devices to make judgments about a student's well-being. Schools are responsible for managing effective use of technology and the internet because of the impact it has on students' academic achievement. Parents play a large role in managing their child's behavior with technology. The skills and knowledge students acquire in school can be used at home to be effective users of technology.

Research Rationale

The goal of this research is to identify strategies and digital resources teachers utilize to advance student learning while mitigating distractions. Teachers need to leave their teacher preparation programs with a solid understanding of how to use technology to support learning (King & South, 2017). For any technology solution to have a transformative impact on student learning, it must have a foundation based on the specific needs of the students themselves. One of the most crucial factors to consider when it comes to technology advancements is the expansion of potential distractions.

One of the biggest distractions to students and continues to be a focal point in debates throughout many countries is the matter of cell phone usage. Beland and Murphy's (2016) study compared schools instituting cell phone bans with schools continuing to allow students to use cell phones during the day. It was found that after a ban had been introduced, the average student attending school had a 6.41% standard deviation greater gain in test scores as compared to a school without a ban. Although 77% of United States schools have banned cell

phones completely by 2020, there are still many who have not and as a result they are facing challenges in managing students' cell phone usage.

Cell phones could be an opportunity for students to quickly find information, but often they are instead used for distraction. There are certainly the possibilities of using a mobile device to quickly find an answer to a question, or to find a definition for a vocabulary word, but the reality is students are often using their mobile devices for applications that are not relevant to their learning. Toh et al. (2019) revealed students often consider time with touch-screen devices as entertainment or moments of relaxation. Students reported they switch from gaming to browsing social-media applications. Felisoni and Godoi (2018) tracked cell phone data from college students in an effort to understand how often students use their phone; the average student used their phone 230 minutes per day.

Schools see the value in technology and the need to be connected to new changes in the world, which is why many districts are assigning Google Chromebooks or similar devices to students for the purpose of education. Schools are now better equipped to monitor their students' technology management by controlling what is allowed to be downloaded onto the devices and by keeping record of the condition of the devices.

As a new teacher, I hope to get a better grasp on how to utilize technology in the classroom in a way that supports the growth of relevant tools while mitigating potential distractions. My motivation to learn about this topic is due, in large part, to spending my first year of teaching in a position in which I taught computer explorations. I often found students were more focused on the lecture when they were not using technology, but they appeared more engaged with their learning once they were told to work independently on their devices.

As a teacher who was a high school student less than a decade ago, I've seen many technological changes that have impacted schools (for the better and for the worse). So, I am interested in uncovering what teachers can do to manage technology for their students in effective ways that will move learning forward, as technology is going to continue to be an integral part of society for years to come.

Although social media is not allowed to be used in many schools, students still often attempt to connect to their favorite platforms nonetheless. It is important for teachers to highlight the aspects of why social media can be addictive and how managing the amount of time spent on it can lead to greater academic performance.

Schools have a responsibility to acclimate teachers with new technologies that provide benefits to learning. Based on Otterborn et al. (2018) study, teachers highlighted the need for adequate resources, such as time for planning, implementation, subsequent work, and suitable access to functional equipment as a prerequisite for successfully implementing tablet activity mandates. It is advantageous to include technology as a tool of enhancement, but teachers have to feel confident in their command of it. Technology-based games, like Kahoot, have proven to give students more opportunities to engage with the lecturer, peers and lecture content (Licorish et al., 2017).

Social media may feel like a new addition to previous generations, but current students have had it available to them for as long as they can remember, depending on guidelines at home. Therefore, this literature review highlights the importance of understanding how the current generation of students acquires information online.

An additional rationale of this research is to inform teachers of the perceptions versus realities of utilizing technology to enhance lessons. Teachers need to be prepared for students who adapt new technologies that are not appropriate for school use. One of the newest technology advancements beginning to cause debate is the use of artificial intelligence programs, such as ChatGPT and other types of generative AI.

Definition of Terms

The following terms were chosen to be defined as they are essential to understanding this literature review.

Algorithmic Literacy

Algorithmic literacy is the combination of users' awareness, knowledge, imaginaries, and tactics around algorithms (Swart, 2021). Algorithmic literacy focuses on the role technology plays within a society: economically, politically, and socially. However, as the interconnectedness between human and algorithm expands—and scholars' increasing concern over the opaqueness of these computations grows—educators must understand the effects of this relationship to better instruct future generations (Koenig, 2020).

Constructivism

“Constructivism theory (Piaget, 1981) focuses on how people make meaning of or construct knowledge when interacting with content knowledge and the active processes of this interaction” (Schrader, 2015, p. 2). Constructivism (Piaget, 1981) is based on the idea that people actively construct their own knowledge, and reality is determined by people's respective experiences. Essentially, people use their previous knowledge as a foundation on which to build new learnings.

Dataveillance

Dataveillance is the systemic creation and/or use of personal data for the investigation or monitoring of the actions or communications of one or more persons. The term emerged initially as a set of tools for exploiting data that had already been collected for some other purpose (Clarke, 1988).

Digital Citizenship

According to the International Society for Technology in Education, a digital citizen is someone who recognizes the rights, responsibilities, and opportunities of living, learning, and working in an interconnected digital world, and they model safe, legal, and ethical behavior. The five competencies of digital citizenship are inclusive, informed, engaged, balanced, and alert (Fingal, 2021).

Digital Literacy

According to Buckingham (2006), digital literacy is often understood as a variety of digital tool utilizations involving simpler and more complex operations, security measures related to the safe use of the digital environment, and information obtained mainly through Internet resources. Students who are digitally literate operate online with precaution and they evaluate information they find.

Learning Management System (LMS)

Learning management systems facilitate coursework organization and access. An LMS is a software application or web-based technology used to plan, implement, and assess a specific learning process. Typically, an LMS provides an instructor with a way to create and deliver

content, monitor student participation, and assess student performance online (Alias & Zainuddin, 2005).

Self Determination Theory (SDT)

A broad framework for understanding factors that facilitate or undermine intrinsic motivation, autonomous extrinsic motivation, and psychological wellness. An individual is motivated by their actions based on perceived autonomy, competence, and relatedness (Ryan & Deci, 2021).

Technology-based Pedagogy

Technology-based pedagogy focuses on implementing different methods of teaching online (Rapanta & Goodyear, 2021). A teacher can display technology-based pedagogical knowledge by using technology to predict students' understanding of a particular topic.

Teacher Educator Technology Competencies (TETCs)

These refer to the competencies (knowledge, skills, and attitudes) all teacher educators need in order to support teacher candidates as they prepare to become technology-using teachers. The TETCs shed light on the roles and responsibilities of teacher educators who address technology within their courses (Foulger et al., 2017).

Guiding Questions

Two guiding questions frame this thesis work. How can teachers manage the responsible use of electronic technology resources in the classroom? How can schools influence parents to model responsible digital technology usage at home?

CHAPTER II: LITERATURE REVIEW

The literature included in this review examines the importance of teachers integrating technology resources in their instructional planning and implementation, as well as managing technology in the classroom, and influencing safe digital behavior at home. Initially searches were related to utilizing technology in the classroom or influencing students' technology usage behavior. Google Scholar was utilized to discover credible resources within relevant search terms. The keywords used in searches were: algorithmic literacy, classroom management, classroom technology integration, constructivism (Piaget, 1981), dataveillance, digital communities, digital citizenship, digital literacy, digital tools, educational simulations, education technology, educational theory, flipped classroom method, impact on education, internet access for students, modeling technology, monitoring students, negatives to technology, pedagogy, proximal development, social media, post-Covid policy, responsible use, school phone ban, self-determination theory (Deci & Ryan, 2012), social learning, technology abuse, technology-based pedagogy, technology training, technology use at home, and teen technology use.

Chapter II is organized as follows: The first section reviews literature related to teachers utilizing technology to enhance their lessons and their students' learning capabilities. The second section is focused on using technology to manage classroom behavior and level of engagement. The third section is about students' technology use at home based on what they were taught in school.

Technology-Based Pedagogy

The headings used in this section are components teachers have a responsibility to control as part of their pedagogical implementation. Various digital tools and resources will be described in further detail as to how they impact the learning of K-12 and college students.

School-Assigned Devices

Teachers can integrate various technology tools into their lessons so students can feel more in control of their learning and involved in sharing knowledge with fellow teachers. Digital tools availability has increased significantly over the years as the need to prepare students for careers involving technology has become a major focus. Ninety percent of United States' K-12 teachers who participated in an Edweek survey said there was at least one device for every middle and high schooler by March, 2021 (Klein, 2021). Aladé and Donohue (2023) conducted a study to understand parents' perceptions of one-to-one school computer programs. This study used a survey-based case study design. Participants were parents of kindergarten students from a large midwestern school district that had recently adopted a one-to-one tablet program.

The survey used closed and open-ended questions to gain insights from the parents. Two hundred fifty-eight parents were surveyed, 201 of which were mothers. The respondents' income levels varied as 51% reported having less than \$50,000 annual household income. Teachers were encouraged to use the digital tablets for at least 15 minutes a day, but otherwise there was freedom to choose how to incorporate the tablets. In all, 56% of parents shared decision making on what applications to use with their children, 27% indicated they solely make application-based decisions for their children, and 12% let their child choose which application to use. Sixty-seven percent of parents believed having a mobile device in their home made

parenting easier, but there was also 41% of parents who were concerned about their child using mobile devices too often.

Ninety-two percent of parents believed it was essential for their children to have access to technology while in school. These parents were not previously consulted about tablets being assigned to their children, which could have led to some of the concerns parents had with having the device at home. The study concluded there was mostly positive reaction to the implementation of the one-to-one tablet program, but there was some concern in regard to children's dependence on their devices to stay entertained.

Monitoring Student Engagement

With the responsibility of providing digital resources comes the expectation that teachers and administration will enforce the acceptable use of them. Otterborn and Associates' (2018) survey of preschool teachers uncovered clear and more informative curriculum guidelines for implementation of tablet technology is necessary to maintain control of students' learning with the resources assigned to them. This survey study was conducted to discover how digital tablets are used to support preschool children's learning in general, and with respect to technology education. The study was conducted in Sweden with preschool teachers across the country being target respondents to an online survey.

The survey was designed to generate information on teachers' use, experiences, and opinions concerning digital tablets (e.g., iPads) in preschools, with an added focus on technology education. The survey was activated from November 2016 to April 2017. An invitation to participate in the survey together with an accompanying webpage link was emailed to 700 preschool directors across Sweden, who were requested to forward the survey

link to preschool educators in their respective district. Half of the survey's responses were randomly selected and read by the first author on three separate occasions. Emerging themes were defined and color-coded into different categories. The second and third authors then conducted independent categorization on smaller sample sizes.

After discussing overall themes that appeared from the study, the incidents of each category in the data was reflected upon in light of the Swedish preschool curriculum. Emerging themes from the results of this study were that digital tablets presented students with opportunities to collaborate with peers, reflect upon and influence activities, and the ability to adapt to various activities. Teachers also described setbacks the digital tablets provided. These shortcomings focused on the resources available for meaningful integration of digital tablet use and associated regulations to integrate tablets in practice, and in regards to inefficient digital skills to successfully engage students with tablet activities. Forty-four percent of teachers expressed the need for systematic and standardized cooperation and dialogue between school management and grass root classroom implementation of tablet technology. The respondents also sought specific training in acquiring necessary digital skills and knowledge (38%), while at the same time, 15% of respondents highlighted the need for adequate resources to be able to successfully implement tablet activity mandates. Twenty-four percent of respondents indicated children's interests, awareness and views should also be considered in future implementation of digital tablets.

Another concern is how students use technology to cheat. In a bid to combat cheating efforts, schools can implement technologies that use facial recognition data to make inferences about a student's integrity (Alia et al., 2013). These technologies have also been recommended

to be used as a way to track attendance in schools, which would shorten the amount of time teachers spend on that activity on a daily basis. Bah and Ming's study (2020) was focused on improving facial recognition data as well as attendance management systems based on recognized human faces. An algorithm was used to compare students' photos with their face on surveillance.

The researchers exploited the following image quality properties for the input and reference face images: illumination, sharp, noise, resolution, scale and pose, so as to obtain the best quality images that will expose better details of image features for more accurate feature extraction and comparison. Captured input face images were processed using the researchers' proposed image processing techniques, then the face detection algorithm was applied to detect faces. Once faces were detected, the face recognition algorithm aided with Bah and Ming's (2020) proposed method was applied to recognize faces. Once faces were recognized, the metadata of the recognized faces was extracted to mark attendance using the attendance system.

The researchers' preprocessed input face images with image processing techniques that would enhance the images. They tested a method of improving contrast in images by testing different values of alpha and beta in the equation: $g(x,y)=a*f(x,y)+\beta$. After this, the researchers compared differing effects with the gaussian blur filter, median filter and bilateral filter on the accuracy performance of their face recognition system. They then used a different equation to reduce noise and control contrast effects in the input images. The equation for this analysis was: $CF(x,y)=g(x,y)*F(x,y)$. After this, the researchers global lighting issues with the equation $Eq=H'(CF(x,y))$. Lastly, the researchers used the local binary pattern (LBP) algorithm to measure

the intensity of pixels. The equation for this algorithm is $S(X)=1$ (if $x > 0$) or $S(X)=0$ (if $x < 0$). The researchers used the previously mentioned equations to improve the overall quality of input images and to enhance the accuracy of the LBP face recognition algorithm. The following advanced imaging processing techniques were concluded to be the most beneficial in providing accurate data from surveillance: Contrast adjustment, bilateral filter, histogram equalization.

Digital Tools

Teachers choose to implement various technologies in their classroom based on the perceived level of engagement with which students will respond. A survey conducted by Ali (2019) to discover the use of technology in teachers' pedagogy showed the majority of respondents use YouTube and Moodle the most in comparison to other digital resources. This study's intention was to examine the influence of evolving technology conceptualizing pedagogy and practice in higher education. An exploratory research design was used to find out how Canadian teachers interact with information and communication technology (ICT).

A Likert type survey was developed to gather qualitative data on how teachers are influenced by technology in their pedagogy planning. Eighty staff members of the education department for the University of Fiji were randomly selected and the survey was electronically mailed to them. Forty-five percent of respondents shared they have integrated Moodle into their instruction, while 42% said they have used YouTube to engage learners. Ninety-five percent of respondents believed technology makes lessons more meaningful. While many of the teachers who were surveyed believe it is important to integrate technology in their classroom, 92% of them still think confidence in using technology is a factor that can be enhanced. Technology cannot directly influence a learning environment, but it can make a

positive difference in learning. According to Alia (2019), tertiary teachers need to integrate ICT into their pedagogy and practice to suit the 21st century learner and to keep pace with emerging technologies.

The University of Otago, located in New Zealand, has found success in utilizing Kahoot! to better connect students with their peers and the lesson (Licorish et al., 2017). Students naturally want to be social with their friends, which can derail a lesson, but it can be used as a point of strength for teachers to utilize within a lesson. Competitive tools like Kahoot! offer students the chance to demonstrate their knowledge against each other. Teachers who choose to take advantage of the opportunities of technology's social components open new avenues for students to learn the concepts taught in class.

Overall, the use of games in the classroom can largely minimize distracting classroom behaviors and activities, and improve the quality of teaching and learning beyond what is provided in conventional classrooms (Licorish et al., 2017). Students from the University of Otago were surveyed at the end of Information Strategy and Governance (INFO322) in the second semester of 2016. During the course, Kahoot! was used for 30 minutes on average. Fourteen students chose to participate in the study, in an effort to provide qualitative data. During the survey, students were asked questions related to using Kahoot! and they were asked to give alternative uses of the game. All participants (14) claimed the use of Kahoot! triggered positive engagement and focus. Nine of the participants indicated there was value in having competition in the classroom as it encouraged them to actively listen during lecture. Six students thought the game helped them understand concepts easier once they left the classroom.

One pedagogy-altering game that has teachers and students in some academic disciplines excited is the stock market game simulation. During the 2021-22 school year, there were over 12,000 students from 190 different schools who participated in the simulation (Musgrove, 2023). The stock market game provides students with a realistic version of the real stock market. Students are provided with \$100,000 in-game currency that can be used to trade stocks for their real-life value. Just like the stock market, the game closes at the end of each business day, so students have to be mindful of how they are spending their time, and teachers need to be in control of how the simulation is being played during class. Overall, the game allows for students to practice their learning and solve problems on their own with the teacher available as the expert to assist where they are needed. This quickly-reactive tool is available thanks to the expansion of the internet and it continues to be leaned on as a valuable online resource for schools to use.

Meltzer (2021) performed a three-year study on the level of engagement with a stock market game with students from a New York, urban community college. The particular stock market game observed in this case was the MarketWatch Virtual Stock Exchange. This game is owned by the Dow Jones and Company. Students were assigned the stock market game during the first week of their finance course. They were tasked with two reflective blogs based on their experiences before and after using the game. Each student was funded in the game with \$1,000,000 to make stock purchases. Students were responsible for keeping track of their holdings on an Excel spreadsheet that would be reviewed by the teacher.

Students were then tasked with writing eight different essays over the span of four different modules. The first essay of each module required students to relate the game to

financial concepts they had recently learned. The second essay of each module tasked students with describing a stock's performance in comparison to their portfolio and the S&P 500 Index. The results of this study indicated students were engaged in the game and they developed a desire to compete against each other. Students achieved the required learning outcomes for the course by defining the role of financial markets, institutions, and securities. The game created an overall positive learning environment that fostered connections between students.

Motivation is positively correlated with engagement; that is, higher motivation tends to lead to higher engagement and vice versa (Yu et al., 2020). The researchers adopted a research design of rapid evidence assessment review. They selected peer-reviewed journal articles based on their inclusion criteria, and then provided a brief summary of evidence. They used the STARLITE (sampling strategy, type of study, approaches, range of years, limits, inclusion and exclusions, terms used, and electronic sources) method to evaluate the quality of literature. The study excluded data before January 2006 and after October 2020.

The study did not investigate engagement, motivation, satisfaction and learning outcomes in the game-based learning context. Through a bibliographic clustering analysis, the STARLITE method of analysis, and evaluation criteria of The University of West England Framework, the researchers limited their results to 11 articles. A limitation of this study was there was no statistical support for the researcher's findings. The researchers determined educational games can motivate students to engage more.

The study concluded teachers should try to establish a gamified ubiquitous learning environment that integrates collaborative learning. The study also indicated learning outcomes can be improved through the integration of educational games. The ability to learn and function

in a technological society is much more important than owning a particular program or software (Ahmad et al., 2004). Ramdani et al. (2021) performed a study with the goal of improving scientific creativity of students through the use of Moodle, during the COVID-19 pandemic. The participants of this study were 24 students in a Research Methodology course.

Researchers performed an experimental method with a one-group pretest-posttest design on the students. Students were given a scientific creativity test consisting of 20 essay questions according to verbal, figural, procedural, and numerical creativity indicators. Students were given a score of one-to-four, which was based on how many answers they could think of for a particular question. Students were compared with each other to create a normalized score. Researchers use the ADDIE (analyze, design, develop, implement, and evaluate) model of research to confirm the validity of their test to determine Moodle as an effective learning management system.

The results of the study showed Moodle is effective for improving students' scientific creativity skills. This conclusion was based on the ability to share a variety of different questions (auditory, text-based, visual) on the learning management system. Learning management systems can be organized in effort to engage students, and achieve learning outcomes. Teachers can manage their learning management system as if it were a social network by posting videos and other relevant information in their feed, while also engaging students with meaningful discussions.

Digital Safety

Due to the emergence of the internet there have been significant improvements added into the day-to-day for students, but there are also more dangers that were not always a

concern. Students now have to be mindful of how they are presenting themselves online and how they are keeping their identities safe while using external platforms. Suson's (2019) study focused on the students' and teachers' awareness of their roles as responsible digital citizens. The researcher used the descriptive survey method to gather information from learners and teachers at Harvest Christian School International, located in the Philippines.

There were 62 total respondents (6 teachers, 56 students). The research was performed with the goal of creating an action plan for members of Harvest Christian School International to become more responsible digital citizens with the likely effect of being better school members as well. The data collected was analyzed with statistical software using 0.05 level of significance. Input into the statistical software included the level of awareness respondents had on the following nine elements of digital citizenship: digital law, safety and security, etiquette, literacy, communication, access, commerce, health and wellness, and rights and responsibilities, the significant mean difference and the issues and concern relating to digital citizenship.

Teachers and students were both compared to weighted means for their awareness of digital safety. If the score was greater than the mean for a particular question, then the respondent was considered to be aware of the component of digital citizenship being measured. The results showed the group's respondents were not fully aware of appropriate, responsible behavior with regard to technology use. Learners and teachers were both categorized as "moderately aware" based on a score the survey created. The study recommended school management should elevate their teachers' and students' general

awareness to elements of digital citizenship through training, seminars, conferences, workshops, and by making a digital citizenship handbook.

Martin et al., (2022) examined the concerns and actions of elementary school's digital safety efforts. Ten teachers, who were all female, participated in 30-minute interviews. The teachers were described as technology facilitators in elementary schools, teaching kindergarten through Grade 5 (ages 5 through 11) in a southeastern state in the United States. Seven teachers had previous training in digital safety before this study. The researchers developed a code of typical responses based on their interviews. Interviews were coded by independent coders, then they were compared and discussed until an agreement was reached. Teachers were sent a copy of the transcript to identify any inaccuracies and to make additional comments through member checking. After this, the codes were discussed with the entire team of researchers to identify additional themes. The results of the interviews highlighted teachers' concerns in digital safety like access to inappropriate content, lack of understanding online dangers, cyberbullying, digital security, and home-related concerns. Actions the schools of these teachers have taken to combat these concerns included instituting digital security measures and limits for students, monitoring students' interactions with technology, and providing education on digital safety with support from guidance counselors.

Researchers categorized the results of the interviews into categories of 4 C's, them being content, contact, conduct, and contract. Content-related concerns were related to incidents where students were accessing inappropriate photos, pornography, or gambling websites. Contact-related concerns stemmed from inappropriate contact with strangers online, or not knowing the dangers of sharing personal information online. Conduct-related incidents

referred to cyberbullying and students' awareness of their digital footprint. Lastly, contract-related concerns were identified as issues with digital security and privacy. Teachers shared that they monitor students' computer screens, one of the surveillance programs mentioned was DYKnow. Teachers reported the need for parents to be trained on the same digital safety concepts as teachers and students.

Teacher Training and Collaboration

Teachers are tasked with training students how to be responsible digital citizens, meaning they participate in safe, ethical, and legal activities while online. According to Suson (2019), there should be seminars and training to help teachers better understand what it means to be a responsible digital citizen. The more training provided for teachers, the more likely they are to buy into new digital resources and they will model responsible behavior for students. Researchers, Zheng et al. (2016) analyzed results from studies on teacher perceptions, beliefs, and instructional approaches.

The study was performed to analyze one-to-one laptop programs in the United States and other countries. The study was conducted with the following chronological steps: literature search, selection of eligible studies for research synthesis and meta-analysis, developed and applied coding scheme for research synthesis, developed and applied coding scheme for meta-analysis, and data analysis. Evaluation criteria was used to synthesize the general impact of one-to-one laptop programs. The criteria included the following aspects: critical features of one-to-one initiatives, interactions and intermediate outcomes, and ultimate outcomes. Zheng et al. (2016) gathered data from previous studies about one-to-one laptop programs in an effort to summarize broad findings. Results indicated when teachers did not feel they were

supported with training or technical support, they felt negatively toward the integration of technology.

The Washington Office of Superintendent of Public Instruction (OSPI) gathered qualitative data from over 100 schools in Washington, 10 other states, Canada, and Great Britain. The study's purpose was to generate a list of successful initiatives for digital citizenship and media literacy so schools could consider adopting new ideas. Washington school districts have attempted to give their teachers effective training on how to teach digital citizenship. OSPI's Chief Information Officer, Peter Tamayo summarized the data (2016), in which different strategies were described that schools within the state of Washington and surrounding areas have provided for digital support.

A Digital Citizenship Survival Kit concept is used in many Washington elementary schools. The concept is built on tangible reminders of important topics in digital citizenship. A couple of the physical items students were given included a permanent marker and a padlock. At Seattle Preparatory School, Michael Danielson has taught a quarter-long media literacy course all freshmen are required to take. Students in this experiment are likely to have been assigned a laptop in their future educational years or they would at the least be heavily involved in technology and social media given the age they live in. The advisory committee for the OSPI felt urgency after discussing issues of media literacy in Washington schools.

Legislation was passed in 2016 that required the OSPI to create a working definition of digital citizenship, which they detailed as: recognizing and valuing the rights, responsibilities and opportunities of living, learning and working in an interconnected digital world, and they engage in safe, legal and ethical behaviors. The legislation also required OSPI, with help from

the advisory group, to recommend media literacy and digital citizenship improvements statewide. Members met three times from June 20 to November 1, 2016 to share successful practices in digital citizenship. The advisory committee's recommendations were that the OSPI should create a working group to align Washington's K-12 learning standards with the International Society for Technology in Education (ISTE) standards for students. The second recommendation was that policy change should be considered to better support digital citizenship, media literacy, and Internet safety in schools.

It was also recommended that OSPI should create a web-based location with links to recommended successful practices and resources (Ibid, p. 3). The study revealed that districts should examine ways teacher-librarians can lead digital citizenship and media literacy across all content areas. The teacher-librarian's responsibilities were detailed as, but not limited to, integrating technology into curriculum, providing instruction to students and teachers about how to use emerging technologies, helping students and teachers access high quality information, instructing students on how to be critical consumers of information, and creating a culture of reading within the school community through a diverse, student-focused collection of materials. The priorities for teacher-librarians and other digital literacy leaders vary depending on the school.

Digital technology has continued to evolve in classrooms and prove to be beneficial to many subjects, but could it be a valuable resource to physical education courses? The primary aim of Wallace's et al. (2022) study was to explore perceived teacher competency levels in applying digital technology to the physical education classroom. Four teachers and 12 students

participated in the qualitative research study. Older students (16-17 years old) were purposely chosen because they had more experience in physical education.

Data was collected from the teachers through semi-structured interviews, which had questions with the freedom to explore answers. A focus group for facilitated discussion was created for the students. In this case, these physical education teachers had integrated technology into their pedagogy through projectors, heart rate monitors, iPads, YouTube, Microsoft Kinect, and Google Classroom. Teachers who were interviewed felt bringing technology into the classroom motivated students to engage more. There were mixed responses from students when it came to their motivation in connection to technology. Students were happy to try something new, as they do not typically see technology in physical education, but there was a general agreement in the students' focus groups that digital tools could not effectively replace the direct feedback teachers provide.

Results showed technology can be used in a physical education setting as a way to get students initially interested before an activity. Wallace et al. (2022) described positive findings researchers found after the use of video analysis tools to facilitate peer-to-peer and inclusive learning experiences (Pyle & Essingler, 2015; Thacker et al., 2021). to try and identify how teachers can impact their classroom in a positive manner with the use of technology. Without a purpose, technology may not be necessary for a class. With physical education, teachers tend to use technology more with the flipped classroom method.

Many teachers have found advantages to being connected to the internet, like the ability to easily find information that enhances students' learning. For example, it provides them with the ability to quickly research classroom strategies and discuss with other teachers

about the sort of lesson plans with which they are finding success. Teachers can improve their understanding of implementing technology through social media (Lantz-Andersson et al., 2017). The researchers discovered teachers in a Facebook group utilized the online community for requesting and giving tips, asking for and providing concrete instructional examples, and questioning and justifying the flipped classroom approach. The study was focused on how learning is sustained through self-organized social media groups. The Facebook group was composed of Swedish teachers who managed flipped classrooms.

Data was collected in April, 2015, when the group had about 13,000 members. Six hundred seventy-five members had started discussion previous to this study with a post, 1,435 had commented on discussion threads, and 6,526 had liked at least one post. Researchers assembled a corpus of all activity within the Facebook group from April 2012 and May 2015. They used an ethnographic inspired method to identify patterns in discussion threads to be examined further. With the insights gained from this approach, researchers used patterns of discussion to create more detailed analysis. A figure was created to represent how much interest group members had in particular discussions posts based on how members interacted and for how long they kept discourse active.

Facebook groups were described as exhibition halls by the researchers because of the way members can be active in discussion, or choose to lurk for information. It was concluded that there were three major themes in regard to online discourse within a Facebook group: 1) requesting and giving tips, 2) asking for and providing concrete instructional examples, and 3) questioning and justifying the flipped classroom approach. These themes would often overlap with each other in discussion threads. In sum, social media groups can enable spaces for

teacher professional discussions where supportive problem solving and sharing of resources, teaching experiences and examples take place (Lantz-Andersson et al., 2017).

Disparity of Resources

While many students may enjoy having access to online communities, the reality is many of them do not have a reliable connection to broadband internet. According to a study by the Pew Research Center, about 15% of all households with school age children in the United States lack an internet connection, and this proportion goes up to 59% among households earning less than \$20,000 per year (Vogels et al., 2020). Pew Research Center conducted a study to understand how Americans think about the role of the internet and cellphones during the COVID-19 pandemic. Adults, 4,917 in all, were surveyed from April 7 to 12, 2020. Participants were randomly selected and the survey was weighted to be representative of the U.S. adult population by gender, race, ethnicity, partisan affiliation, education, and other categories. Fifty-four percent of Americans surveyed viewed the internet as essential, while another 34% just considered it to be important, but not essential.

Regardless of how many participants view the internet, 62% of them did not believe it was the federal government's responsibility to provide high-speed internet connection during the COVID-19 pandemic. Thirty-seven percent of respondents indicated that schools are responsible for providing devices that connect to the internet in order for students to complete digital work, while 43% believed schools should only be responsible for providing devices to families who cannot otherwise afford it. Smartphone ownership is more prevalent than desktop computers for households in the United States (Martin, 2021, p. 3). Students from lower

income families are less likely to have access to broadband internet, which can make it harder for them to rely on technology.

According to Vogels et al.'s (2020) study, students from lower income families (36% of respondents) were less likely to complete schoolwork during the COVID-19 pandemic because of lack of access to a computer at home. Some 28% of home broadband users said they had some (19%) or a lot of worry (9%) about being able to afford paying for internet during the COVID-19 pandemic. Lower-income families were shown to be more likely to be worried about not being able to pay for the internet with 52% of respondents indicating their concern. This compared to only 26% in the middle class and 9% in the upper class. Teachers must try their best to communicate with students in effort to find out how reliable their home internet connection is. Collaborating with students who do not have reliable internet can be difficult as many applications require updates or online connection.

Social Media

Social media's effect on education has become a polarizing topic as it has evolved over the last decade. There are perceived benefits social media appears to provide, but the uncontrolled drawbacks have dominated decision making for schools. There are some applications that are beneficial to teachers, if they are used properly and taught with confidence. Understanding how to effectively use social media applications could prove useful to future business owners that are currently students. Mobile social media devices change the way teens communicate. As found in the recent technical report on digital media by the American Academy of Pediatrics (AAP), "as communication moves from face-to-face and voice-

only phone conversations to more screen-to-screen interactions via apps, such as FaceTime or Skype, daily communication is becoming intertwined with screen time” (Reid et al., 2015, p. 3).

Students are not the only ones using their phones often, as they are likely seeing family and friends using their devices as well. Children are replacing time they could spend making genuine social connections or building skills with addicting algorithms. Everyone is susceptible to social media addiction, as almost every American owns a phone that can connect with millions of people online. Many phone users interact with social media to feel a sense of belonging with communities who share similar interests with them. This is not exclusive to students, as teachers and parents often go online to do the same thing. In 2022, there were over 700,000,000 fake accounts on TikTok (Daniel, 2023). Users have found ways to spread fake information on social media in the past, which can lead to mass confusion (Shu, et al., 2020). New technology has the potential to detect fake news faster, which would help social media companies’ ability to control the spreading of misinformation.

Learning Management Systems

Teachers of the 21st-century work with students who are deeply connected to the digital world, which can take on a life of its own. Teachers are presented with opportunities to connect students to digital technologies in ways that may feel familiar to how they navigate their personal lives online. Learning management systems attempt to create similar features to popular social media platforms that make the student experience more impactful. One of the recent systematic reviews on research trends in STEM education indicated that ‘learning environments’, which include an LMS as one key area, will continue to evolve (Li et al., 2020). The literature review was initiated in an effort to identify trends in STEM research from 2000 to

2018. The research method was to identify journals first and then identify and select STEM education research articles published in these journals from January 2000 to the end of 2018.

Through test-coding and discussions, the researchers found seven categories that could be used to classify 798 articles that were deemed to be relevant. The seven categories created were: 1) K-12 teaching, teacher, and teacher education in STEM (including both pre-service and in-service teacher education), 2) Postsecondary teacher and teaching in STEM (including faculty development, etc.), 3) K-12 STEM learner, learning, and learning environment, 4) Post-secondary STEM learner, learning, and learning environments (excluding pre-service teacher education), 5) Policy, curriculum, evaluation, and assessment in STEM (including literature review about a field in general), 6) Culture and social and gender issues in STEM education, and 7) History, epistemology, and perspectives about STEM and STEM education. Five hundred forty-nine out of the 798 articles had the word “STEM” (or STEAM, or the phrase of “science, technology, engineering, and mathematics”) written in the article’s title or both title and abstract. Two hundred forty-nine articles did not have the same identifiers in the title but abstract only.

Results indicated researchers often used the word STEM to highlight their research about STEM education. Seventy-five percent of STEM publication contributions came from the United States, and other articles were published by researchers from Australia (4%), Canada (2%), Taiwan (1%), and the United Kingdom (1%). The number of STEM-related publications increased sharply from 2010. The research category of goals, policy, curriculum, evaluation, and assessment represented about half of publications (375, 47%). The category with the second most publications was K-12 teaching, teacher, and teacher education in STEM (103, 12.9%)

which was followed closely by K-12 STEM learner, learning, and learning environment (97, 12.2%). The results suggested the STEM research community had broad interest in both learning and teaching in a K-12 setting.

An effective learning management system gets students seamlessly connected with their learning materials as well as opportunities to collaborate with co-students, which can feel like a social media platform to students as they become a part of the digital learning community. The Learning Management System (LMS), also referred to as Course Management System (CMS) or Virtual Learning Environment (VLE), has evolved over decades of technological innovation to become a cornerstone of institutional instructional technology infrastructure (Rhode et al., 2017). The goal of Rhode's et al. study (2017) was to identify what LMS tools University of Northern Illinois faculty uses in their courses the most often, as well as how the LMS tool has changed over time, and whether an LMS tool is used differently depending on the modality of the class (virtual versus in-person). The study was focused on the LMS system, Blackboard as it is what the University being reviewed used. Researchers were able to access automated methods to identify how LMS tools were used. For every time a tool was used, the tool was coded as 1, and if it was not used the tool was coded as 0.

According to the results of the study, 92.1% of teachers utilized the Blackboard LMS at Northern Illinois University in fall of 2015, although that number fell to 87.9% the following year. The most frequently used tools in the fall 2016 semester were: announcements, items, grades, folders, files, assignments, web links, plagiarism detection, discussion boards, and tests, in that order. Researchers believed in 2015, more teachers were using the LMS because students were required to pay for printing services that year at the University. Online courses

used top LMS tools more than in-person classes, which should not come as a surprise. Two tools used less frequently for virtual classes as compared to in-person classes were plagiarism detection, and files. Northern Illinois University used the data from this study to update staffing needs during the summer, and identify which teachers could use more training on how to manage the LMS. Learning management systems proved to be essential in the online learning environment, but they are used for most classes now as schools have become data-driven to understand their students better. Data captured from learning management systems could be used to inform institutional decision-making processes and identify potential "at-risk" students (Dawson et al., 2008).

Learning management systems can become an integral part of students' education, but only if they are easy to navigate. There are various systems available, and most of them have customizable features for data, design, and engagement. Systems need to be flexible and be easy for a teacher to quickly learn how to use. Effective learning management systems provide a structure for changes to be made within.

Mobile Applications

Students can be placed into lifelike simulations for a career in which they are studying to work, but often those opportunities are limited at the K-12 level because of funding or lack of resources. Some classes that utilize technology can benefit from programs with immersive education lessons that would not be possible without access to modern technology. Birt et al. (2017) explored how mobile applications reinforce online learning, in this case, in the training of paramedics in Australia. Through the use of 3D and augmented reality, they trained university students before carrying out work experience. The simulation proposed in this study

required users to use both hands to demonstrate skills. Users first were walked through a tutorial, and then they were taken into a virtual direct laryngoscopy with foreign body removal skill exercise. Step-by-step directions were shown in the simulation for students to follow.

There were two loops of testing, where 159 students were enrolled in the program, and 55 were invited to participate in the simulation before attending residential school. Once all 159 students arrived at residential school, they were pre-tested using airway mannequins by qualified on-road paramedics. The students needed to successfully place the laryngoscope on the right side of the mannequin's throat, then elevate the laryngoscope without levering of the teeth, then remove the obstruction from the mannequin, and successfully remove the laryngoscope without causing any damage. Participants either passed or failed each of the steps in these procedures. All students were then given access to the simulation program, and at the end of the residential school the students were surveyed on their experience with digital tools. The results of the study showed statistically significant improvements in several key performance indicators in students who were studying remotely, but also showed methodological problems by including these applications in their training.

Some vocational classes at the high school level could benefit from this sort of technology integration but it would require the support of the school district. Results of the paramedic study showed a significant improvement for students who received the tools before residential school compared to those who did not receive the tools (Birt et al., 2017). There was a general acceptance in regard to welcoming 3D, augmented reality, especially from students who had access before residential school. Seventy-five percent of students indicated via the survey that they found the use of multiple forms of media to be effective. Limitations to

implementing similar technology in K-12 schools are cost and time to develop a simulation. Birt et al. (2017) indicated it would have been beneficial to observe the students use the simulation in real-time, prior to residential school.

There are further improvements required for students to truly believe their learning is related to what they will experience in a job. Virtual reality is extending what is possible for learners, although it is not a tool that is mainstream at this time. There are various careers that have trained individuals with the assistance of virtual reality, like health care professionals (Birt et al., 2017). Individuals who participate in virtual reality training are absorbed into an interactive learning environment that blocks out external distractions, like cell phones. Virtual reality could be a valuable resource for K-12 education, but for now it is expensive and there is not enough research to prove its price for many schools. Keeping students engaged is the key to holding their attention for key educational content. Continuing to focus on what students enjoy in education will ensure they perform well academically and feel pride for their achievements.

Student-Centered Technologies

Students can be motivated by technology that is engaging and feels new to them. Student-centered technologies have not only increased student motivation and academic performance, but interactive technologies can lead to differentiated instruction through which students have again shown higher motivation (Hoffman & Ramirez, 2018). The study performed by Hoffman & Ramirez (2018) was designed to gain insight on students' attitude in regard to teachers managing technology. The study took place in a southern California high school. The city had an average household income of \$122,000, and the school was fairly diverse as 36% of students were Latino, 31% were Asian, and 23% were Caucasian. Many students who came

from multicultural backgrounds were not counted as such during this study. Differentiating lessons often is a key learning requirement for students due to the varying learning styles that exist in the classroom.

Students from history classes were asked to participate in this study, and 73 ultimately completed the survey through a Google form. Sixty-two percent of students who participated identified as female and 38% male. Forty-nine percent of students were in 9th grade and 51% were in 11th grade. All questions were optional, and students could choose to exit the survey at any time. Many questions had students ranking their feelings in regard to technology-related topics from 1 to 4 on a Likert scale. Twenty percent of students shared they did not feel their teachers were using social media and websites to connect to their teaching. Seventy-six percent of students said they felt more engaged when teachers communicated with them via social media. Eighty-two percent of students were more engaged when teachers offered different apps to use. Depending on the subject, something technologically advanced could be accessed to enhance the education of students. Teachers can make a strong connection with students by gaining insight on what technology is viewed as engaging.

Teachers were required to adapt to technology more than they may have wished due to the COVID-19 pandemic. The pandemic affected many industries and forced families into new routines that depended more on the stable internet connection. Education was impacted financially and by the long-term learning effect it left on k-12 students. Students are more digitally connected than they ever have been, and they feel an innate need to be connected to their learning with relevant technology, various digital resources.

Students expect different levels of difficult tasks so they can feel challenged in their work (Chiu, 2021). The researcher proposed digital support that satisfied the three needs of Self Determination Theory (Deci & Ryan, 2012), referring to autonomy, relatedness, and competence. In order to satisfy autonomy, the researcher suggested teachers should offer and recommend various digital resources for the same unit while signifying their relevance. In order to satisfy relatedness, the researcher proposed personal and emotional designs for the learning management system in effort to communicate a positive learning environment. In order to satisfy competence, the researcher suggested offering varying levels of difficulties for assignments.

This study had the goal to examine how well the researcher's proposals encouraged students to engage. Four hundred twenty-six 11th grade students and four teachers from four different Hong Kong high schools. Students ranged from 16 to 18 years old; 52% were female and 48% male. This case study used a quantitative research method in the first stage which resulted in objective statistical data. In the second stage, semi-structured interviews were conducted. Questions during this stage were centered around Self Determination Theory (Deci & Ryan, 2012), and the goal was to generate open discussion that could explain outliers in the previously collected quantitative data.

In the main component of Chiu's study (2021), each school was randomly placed in the digital support group or the control group. Students then were taught a mathematics topic in a flipped classroom environment for 10 consecutive school days. Students were tasked with completing pre-lesson activities in their learning management system at home. Students then would receive an in-person lesson built on what they learned in the pre-lesson activities. After

the last lesson of this topic, students completed a questionnaire on their perceptions of digital support in the flipped classroom environment. The questionnaire consisted of 10 Likert-style questions. Results of the study showed there were no differences in perceived autonomy, competence, and relatedness from teachers between the digital support group and the control group.

The study also discovered the digital group had greater perceived behavioral engagement than the control group. There were no major differences in emotional engagement. Overall, the results showed Chiu's (2021) proposed digital support strategies improved students' perceptions of autonomy, competence, and relatedness support from their learning management system, which led to more engagement. Students require the same level of support for virtual or flipped classroom courses as they would for in-person classes. Focusing on Self Determination Theory (Deci & Ryan, 2012) as a framework to get students engaged should be a priority for teachers, based on the results of this study.

Student Motivation

Education was severely impacted by the coronavirus pandemic that forced students into an unfamiliar learning environment. Huck and Zhang (2021) rushed to find the specific pains teachers were experienced during the pandemic, and they found teachers lacked not only the technology skills to adapt to online teaching but more importantly they were not connecting well with students' social, emotional, and academic needs. A literature review was conducted to discover how researchers connected with teachers during the COVID-19 pandemic. The most common methods of data collection found from the research were surveys, interviews, and secondary data analysis. Teachers were sampled the most, followed by parents, school leaders,

and students. It was found that most parents were in favor of schools shutting down, but they were also taking on new responsibilities in ensuring their children participated in online learning. Students who came from higher socioeconomic environments showed greater engagement in online learning.

Getting students to engage with a lesson is based entirely on how motivated they are to do so, and teachers need to convince students the subject matter is more important than something else. The highest form of motivation for student activities is based on their self-evaluated autonomy, competence, and relatedness (Deci & Ryan, 2020). Self Determination Theory (Deci & Ryan, 2012) states students are motivated based on physiological needs for their work to feel autonomous, relate to the real world, and be/become competent. Teachers are often compelled to design projects that feel relevant to life outside of school. When presenting projects, teachers can provide their students with options to meet the standards. Students show greater behavioral engagement when they are proactive in pursuing learning opportunities and take responsibility for their own learning (Chiu, 2021). There are multiple ways to complete the same task when it comes to digital work. For example, if students were asked to design an infographic using digital tools, they could do so by using Canva, Adobe Photoshop, Microsoft Word, or a different program if it interests them.

With the assistance of technology, teachers have adopted the flipped classroom approach (Carstens et al., 2021). The purpose of Carstens' et al. (2021) study was to analyze the effects of technology on student learning. The researchers distributed a 14-question survey to K-12 teachers at a school district in Illinois. Sixty-two percent of respondents were elementary teachers. The results of the study were there are positive and negative aspects of technology

teachers have to manage. Some respondents thought there should be more support for implementing technology, and they see the value in using digital resources in class. Some respondents also felt too much time has been spent trying to get students adapted to new digital tools. Teachers can use the flipped classroom method to get students acclimated to technology easier. The flipped classroom method provides students with lectures and slideshows in their learning management system before they come to class. Students are able to prepare for their lessons in advance and spend their time in class on active learning that keeps them involved. Technology can enhance students' group participation efforts as well due to the cloud sharing capabilities many applications offer.

Classroom Management

This section describes how teachers can manage their students' academic achievement and behavior through the use of data surveillance technologies. Additionally, teachers can use learning management systems and video conferencing software to connect with parents.

Managing Behavior

As schools are attempting to immerse students in new technologies, they have to consider how to monitor the behavior of students while using their devices. Schools have implemented security technologies that can notify teachers of time spent off task as well as signs of self-harm students have searched. GoGuardian, the most popular of these services, currently tracks the digital activities of more than 25,000,000 students and 500,000 teachers in more than 10,000 schools (Nichols & Monea, 2022). In 2016, GoGuardian made headlines when a California school used one of its incident reports to intervene after a student was found searching for terms associated with self-harm. This created speculation of the possibility to

uncover more accurate results like this from student data. GoGuardian and competitors have continued to create new ways to monitor students' online behavior. Protecting students with GoGuardian or similar dataveillance technologies comes with the cost of students being subject to invasive forms of data-driven surveillance. Educators often report feeling uneasy about both the volume of data harvested and the ways this information can position students as potential risks to be managed rather than learners to care for and support (Nichols & Monea, 2022).

Dataveillance is not a particularly new concept, but it has evolved over time to adapt with changes in technology. Today's dataveillance technologies make their own determination about what behavior requires the teacher's attention. While there are positive stories with dataveillance in terms of keeping students safe, there are also instances where students feel the opposite and faculty needs to be prepared for objections. Dataveillance technologies have proven to make students less trusting of authority figures as they may feel their privacy is being invaded. Intensive surveillance makes young people feel singled-out and scrutinized, even when they have done nothing wrong; one consequence of this is it makes them less trusting of the teachers or authority figures who they associate with these forms of surveillance (Livingstone et al., 2019). Dataveillance will not be going away anytime soon and will continue to evolve as schools choose to follow the data imperative (Fourcade & Healy, 2017) where the perceived benefits of collecting some data are used to justify the collection of more data, and so on.

There is not much evidence (Nichols & Monea, 2022) to confirm dataveillance technologies keep students safer, but that does not stop companies from making claims they prevent incidents from occurring in the first place. Despite lofty claims in companies' marketing materials, their "success stories" are almost exclusively anecdotes about hypothetical what-ifs,

and the evidence from actual use in schools points to significant inaccuracies in their judgments. The results of these inaccurate reports do not fall evenly on all students. Because dataveillance technologies can inherit race, class, and gender biases from their creators, school dataveillance can disproportionately affect students from marginalized communities. Regardless of the detriment that can be caused to these marginalized students, data is often collected and used to make informed decisions. The inaccuracies uncovered in the study (Nichols & Monea, 2022) resulted in recommendations to change data practices and data surveillance functions by threatening to not renew contracts with GoGuardian or other data surveillance companies.

Teachers can utilize technology as a way to connect with families after students are caught in a crisis. Technology such as a learning management system or video conferencing software can help educators and students remain connected to each other and engaged with content (Hitchcock et al., 2021). Teachers can use systems that students are motivated to use to connect easier with them as well as with parents. Teachers can use technology to stay focused on trauma-informed teaching practices during a crisis. If another crisis, like COVID-19, were to occur, teachers would likely see students display a variety of psychological needs that were previously satisfied in a physical learning environment.

Cyberbullying

With the allowance of cell phones comes the opportunity for students to cyberbully or share inappropriate media during school hours. A study (Torres et al., 2020) was conducted to measure associations between bullying victimization and academic achievement. Data for this study came from a 2015 National Crime Victimization Survey (NCVS). The sample included

4,610 middle and high school students from across the United States. The survey was self-reported, so a limitation was the honesty of students in regard to their academic performance. Students were initially asked questions about the type of bullying they experienced as the researchers sought to differentiate academic performance in comparison to intensity of bullying. The researchers also measured the frequency in which a victim was bullied. The researchers found only physical bullying had a significantly negative impact on academic achievement, in comparison to social, verbal, and cyberbullying victimization. It was also concluded that social bullying has a negative impact on academic achievement, and this type of bullying is often intertwined with cyberbullying. Rumors spread online can become a distraction for students when their focus would ideally be on academics.

Teachers hold a responsibility to recommend suspension or expulsion based on a student's social media activity, which opens the opportunity for teachers to better prepare themselves for situations that may require their intervention. Administration or anyone else that sees something suspicious online has a responsibility to report what they see immediately to the school, or law enforcement if necessary. An effect from teaching digital citizenship is students feel inclined to report potentially harmful behavior they see online. The need for students to become involved with their own safety has become more necessary than ever as they can see dangerous messages or other forms of cyberbullying from their classmates online.

Teachers can use data monitoring programs to keep an eye on students' harmful behaviors. Somebody could go online and say something with the feeling there is no remorse for their actions. Some students may feel they can behave differently online versus the way they are in school or other public places. It is important for teachers to highlight the

permanence of posting on social media. According to Piaget's (1981) constructivist theory, students may have an opinion on something early in life that completely changes when they receive new information at a later point. As social media platforms and the trends that come with them change, so do the people who use them (Schrader, 2015). Based on the constructivist approach (Piaget, 1981), students build on their learning through social media based on who they follow and what information they want to learn.

Cell Phone Usage

Teachers can model the use of technology, when it is beneficial to the students' learning experience. Common reasons for teachers' reluctance toward integrating technology into the classroom are lack of confidence in the tools and discomfort or fear of their usage (Hoffman & Ramirez, 2018). Modeling the correct use of devices can make it more likely students will use their devices effectively during times of stress, like a school emergency. Teachers have mostly been in favor of removing cell phones from classrooms, while parents have been split on the topic.

One argument to the inclusion of cell phones is they provide students with opportunities to connect their learning with internet resources or applications that are easily available on their phones. Schools grapple with the distractions cell phones cause on a daily basis with concerns parents have in regard to emergencies. In March, 2015, New York City, the largest school district in the United States with approximately 1.1 million students, reversed its long-standing ban on cell phones in schools (Dodson, 2020). Mayor Bill De Blasio was in favor of the policy change, stating he felt it was important for parents to be able to easily contact their children during the school day.

Gajdics' and Jagodics' (2022) study focused on exploring the effects of a trial program called "mobile-free school day." The researchers wanted to know if learners were more engaged and less stressed without their phones being present. Two hundred thirty-five students (179 girls, 56 boys) from a small-town high school in Hungary participated in the study. Parents and students were warned about the mobile-free school day a month before it occurred, and when it did, students were required to turn in their phone to their homeroom teacher before first period, and they received their phone back at the end of the day.

During the first part of the mobile-free school day, students answered a questionnaire, a mobile usage scale, an anxiety test, and another questionnaire about class engagement. For the second part of the study, students were asked to again complete the anxiety test as well as the questionnaire about class engagement, as well as a new questionnaire that asked for their feedback on the mobile-free school day. Questions in this study were on a 5-point Likert scale for students to rank their perceptions upon. The results of this study showed that students who tended to use their phones more often during school previously to the mobile-free school day had heightened levels of stress without their device.

The study acknowledged that students often use their phones as a stress reducer during inconvenient times. Removing phones from school could result in other problems as students scramble to alleviate their anxiety. The newness of not having phones in school could have caused additional stress to students, as they had been conditioned to check their phones frequently throughout the day due to a fear of missing out. Class engagement was unaffected by this study, and many students showed negative feelings towards the strict phone ban. There is still growing support among teachers and parents to ban mobile phones or other personal

devices (Selwyn & Aagaard, 2021). Banning phones from classrooms can force students to reorient how they view their technology usage.

By 2020, the percentage of schools with cell phone bans had jumped to 77%, according to the National Center for Education Statistics (Walker, 2023). Students are shown to be less likely to use their phone when they are interacting with the lesson, for example digital applications like Quizlet and Plickers have resonated well with students (Hoffman & Ramirez, 2018). Students have been shown to improve their academic performance with the institution of cell phone bans for low achievers, but shows little difference with high achievers (Beland & Murphy, 2016).

Providing students with expectations for how they are allowed to use their phones and other devices provides faculty with a framework to lean on when defending disciplinary decisions. Kolb (2015) was surveyed by NEA Today, and she believed schools can and should develop a protocol with rules and structures for how students physically handle their devices in the classroom (Kiema, 2015). Kolb teaches in Michigan, where guidelines have been set for teachers to meet the needs of their students while addressing obstacles for learning. Kolb referenced giving students the “green light” to use their personal devices for a brief period of time when cooling down from a learning activity. Michigan’s policy allows for teachers to make the decision of whether they are going to allow mobile device usage during class, and it gives them the chance to still set clear expectations for how the devices will be used responsibly during class, with consequences if standards are not met. This policy gives students some level of freedom with their devices, while getting them to buy into the lesson. Schools should

prioritize their technology management efforts on issues related to academic performance or student safety.

Perception of Integrating Technology

Teachers should not use technology resources without a clear plan for how students will use them responsibly. Teachers should focus on pedagogy and use technology to help them accomplish previously set goals. In order to bridge the gap to students, teachers must find ways to learn about new technology and how it can impact their classrooms. According to Wallace et al.'s (2022) study, teachers reported students were generally more motivated with the use of technology tools. Responses from students were mixed in comparison. In general, students have shown interest in new technology that would motivate them to learn. One student stated using video is useless if there is not a direct purpose in the class for it.

Technology has the potential to expand learning for students, but it can also help them lose focus. Piaget (1981) explained that students learn in stages, where they accept new ideas and potentially change their minds on the subject at a later point in life. Technology breaks down barriers for learning so that anyone can get an answer to a question they have within a matter of seconds. As students construct their knowledge based on their surroundings, they also receive a barrage of information from various online sources. According to Schrader (2015), it can be harder for students to accept new information as technology continuously changes the way people think.

Technology Use at Home

This section describes how understanding technology and the internet influences overall safe behavior. There is a need for parents to be given education on digital technology so they know how to monitor their children.

Consistent Expectations

Policies and procedures are created by school districts to maintain some level of control over how their students interact with the digital world, but these practices are not often maintained once students step off of school grounds. Hollandsworth (2011) stated that the growing level of internet access and student use, both in and out of school, raises the question, “Who will own this challenge of guiding students toward a productive and safe technological society?” (p. 1). Typically, administrators or media specialists displayed greater leadership in developing curriculum for instruction (Hollandsworth, 2011). In order to better understand how digital citizenship has been taught in schools, a survey was distributed to 500 education professionals by Hollandsworth (2011), 97% of whom were library media specialists.

Forty-nine percent of respondents felt that teachers were very aware about issues in digital citizenship. Teachers need to be on the page with technology leaders in regard to how to use digital resources in a classroom, otherwise the instructions that a student receives from each of their classes throughout the day could feel different and cause confusion in regard to what is expected from them. Similar to how teachers are responsible for motivating students with technology, administrators can do the same to get more engagement with training. It takes a village to teach digital citizenship to students, which includes administrators, teachers, media specialists, parents, and students.

A teacher can model effective behavior for their students during a fraction of the day they have them, so when the students move onto a new teacher there needs to be clear continuity with what is expected of students. In Hollandsworth's (2011) previously mentioned study, it was found that 86% of respondents teach their students proper behavior on the Internet, while only 37% continue this education with parents. Since teachers and other educational leaders only get to influence students during class hours, it is essential that school districts provide resources for parents to be able to encourage the same type of behavior at home. Schools can connect with parents frequently to get an understanding of what their child shares with them about school. This can be an opportunity for teachers to share tips on how to manage behavior with technology.

Digital Literacy

How students obtain knowledge outside of school is important for faculty to understand because teachers can correct misconceptions that students take as a matter of fact when they read something online. The news young people consume is increasingly subject to algorithmic curation (Swart, 2021). It is relatively unknown about how young people perceive and interact with online news, but it is fueled by what they are personally interested in. People under 25 in particular depend on personalized media for news, such as Facebook, YouTube, and Instagram (Kalogeropoulos, 2019). Organizations are changing the way they present news because young people are heavily influenced by what shows up in their news algorithms. Since algorithms are highly customized to users, it is important for students to remember principles they were taught in school that could be applied to their understanding of how algorithms work.

Regardless of the way's algorithms target users, the concept is not part of many schools' curriculums. Students' algorithmic literacy is based on what teachers are willing to teach them and what else they learn about algorithms outside of school (Swart, 2021). Students' overall awareness of how social media applications like TikTok and Instagram operate can potentially help them manage their own behavior. Alyssa Moukheiber, a dietician for Timberline Knolls, a treatment center outside of Chicago, believed a TikTok trend contributed to a surge in eating disorders across the United States (Hobbs et al., 2021).

The trend was created by automated accounts that shared dangerous tips like "eating 300 calories a day" or outright shaming viewers for giving up on an effort to lose weight. Moukheiber also went on to say that Timberline Knolls had 650 admissions for minors with eating-disorders from March to December, 2021, which was twice as many in comparison to the year before. Stephanie Zerwas, associate professor of psychiatry at the University of North Carolina corroborate with Moukheiber's previous statement, sharing that many of her young patients would go down rabbit holes of eating-disorder related content. Katie Bell, co-founder of the Bay Area Healthy Teen Project, said the majority of her 17 year old patients indicated TikTok played a role in their eating disorders.

TikTok moderators are tasked with monitoring over 34,000,000 posts a day, many of which include minors (Daniel, 2023). Users often use hashtags on TikTok to engage with specific content. With the case of users who have eating disorders, they were unable to search for hashtags that specifically referenced losing weight, but users come up with codewords to use as a replacement. TikTok can be uniquely insidious for young people, because of its video format

and powerful algorithm, said Moukheiber (Hobbs et al., 2021). TikTok's algorithm is quickly reactive to what users are watching, which can be harmful content.

Artificial intelligence is a new technology that has become a focal point in conversations for students and teachers who are digitally literate. Xia et al. (2022) performed a study to measure the effectiveness of Self Determination Theory (Deci & Ryan, 2012) in association with the use of artificial intelligence tools. The researchers performed two studies that would highlight the differences between gender and academic achievement. In the first study, there were 64 male and 64 female grade 9 students who participated. Students were enrolled into an artificial intelligence program over 15 days in the summer. Students received a pretest before the program as well as a posttest once it was completed.

The program used frameworks suggested by Chiu (2021a). The control group of Xia et al.'s (2022) study was not given support in regard to the core aspects of Self Determination Theory (Deci & Ryan, 2012). Students' need for competence was satisfied when the teachers explained to the students how they could make progress and achieve the desired outcomes in structured learning activities. Teachers formed groups based on students' self-identified problems from teacher-student meetings. Students' need for autonomy was satisfied by giving groups the opportunity to choose what aspect of artificial intelligence they wanted to study in the program. Teachers compared the posttest and pretest to determine how effective Self Determination Theory (Deci & Ryan, 2012) connected with an artificial intelligence curriculum. Researchers analyzed the study by comparing statistical means from the pretest to the posttest. Results of the study showed the program satisfied the three needs of Self Determination

Theory (Deci & Ryan, 2012). Perceived learning was improved regardless of gender or previous achievement.

Problematic Behavior

Students are becoming more connected to the digital world each day, while at the same time not often making genuine connections with their peers in person. One of the main concerns noticed by teachers is that students are not often showing as much empathy to their cohorts as compared to students from previous generations. According to Ribble's and Northern's literature review (2013), a study (Konrath et al., 2011) at the University of Michigan Institute of Social Research yielded results showing students surveyed were 40 percent less empathetic than survey results from 1979. Konrath et al. (2011) discovered these results by performing a literature search for articles that cited the original sources of the Interpersonal Reactivity Index (IRI) using the Web of Knowledge citation index (Davis, 1983). There were 72 samples observed in Konrath's et al. (2011) study, 69 of which signified the number of males versus females who participated. The decline in empathy has steadily declined since 2000, according to the results of this study. There was no clear evidence of what has caused the drastic drop in empathy among students, but the researchers speculated the rising use of technology in everyday life has played a role. In addition, exposure to media and technology may desensitize people to the pain of others if people are constantly bombarded with reports of violence, war, terrorism, and so on (Konrath et al., 2011, p. 10).

The original Interpersonal Reactivity Index was created with a 4-point Likert-style scale to measure the differences in students' levels of empathy. Davis' study (1983) surveyed 677 male and 667 female students. In this study, all participants were tasked with completing a 28-

question survey that included four 7-item subscales, each of which assessed different components of empathy. The different components of empathy students were judged upon were: Interpersonal functioning, self-esteem, emotionality, sensitivity to others, intelligence, the Mehrabian and Epstein emotional empathy scale, and the Hogan empathy scale. The Web of Knowledge is a database that includes journals from social and behavioral sciences. Participants responded to IRI-based questions. The study recommended teachers take ownership of showing students how to be responsible digital citizens which includes respecting, educating, and protecting themselves and other people while online. The article stated technology is imperative to include in education, but it is more important to stay true to pedagogy and not impact learning negatively.

Schools are mindful of students' social media use outside of schools because their digital footprint can provide information about potentially harmful behavior. Problematic social media behavior is associated with conduct problems, hyperactivity, and sedentary behavior (Balt et al., 2023). The researchers reviewed data from an observational, psychological autopsy study that was focused on adolescent suicide in the Netherlands. Qualitative information was collected from one or both parents of the children that had passed. Secondary information was also gathered from other family members, peers, teachers, and health care professionals. Semi-structured interviews were conducted that were constructed in two parts.

The first part focused on respondents' perceptions to what contributed to the suicide of the adolescent they knew. The second part was more structured as it had topics the interviewer focused on: 1) adolescence, 2) physical and mental health and healthcare use, 3) social media use and games, 4) sexual orientation and gender identity, and 5) religion and ethnicity. In 2017,

81 adolescents (10-20 years old) in the Netherlands committed suicide. Out of the 81 adolescents, there were 35 that were used in this study's sample. Twenty out of the 35 adolescents that were studied used social media on a daily basis as a way to keep up with friends, or express their feelings. Eight girls from the study visited forums that were related to mental health or eating disorders. Fourteen of the adolescents were described as socially insecure, and dependent on social media for communicating with peers. The results of this study showed many of the adolescents who committed suicide developed an online identity focused on negative mental health, and they would constantly consume content related to suicidal ideation.

Social media can provide students with a sense of belonging that allows them to freely express themselves, which can lead to individuals feeling the need to be consistently connected. Social media can alter a person's thoughts about themselves based on what they see other people posting. This can lead to depression and even suicidal ideation in some cases. While incidence of depression has increased among teens, the rate at which teens with depression obtain mental health services has remained steady and relatively low (The Federal Interagency Forum on Child and Family Statistics, 2021), indicating a need for mechanisms that provide targeted interventions (Adekanmbi et al., 2022).

Social Media Restrictions

Depression induced from social media has changed the way teens value relationships and the way they view themselves. These mind-altering effects that come from social media have led lawmakers to consider creating restrictions for teens and children. Utah and Arkansas recently passed legislation that would severely restrict teens' access to social media platforms,

potentially denying them access to social media's identified benefits and denying them an understanding of how to use social media in an age-appropriate way (Longe, 2023, p. 5).

Beginning in 2024, social media companies operating in Utah will be required to verify the age of a Utah resident seeking to make an account and will require the consent of a parent or guardian. Arkansas passed similar legislation that required companies to work with third-party vendors to perform age verifications, and parents would have to consent to their child making a social media account. These new legislations could inspire other states to implement similar restrictions. In March, 2022, in his State of the Union address, President Biden talked about "the harms of social media" on children and called on Congress to ban targeted advertising and strengthen privacy protections for children (Barkley, 2023).

Flipped Classroom Method

In regard to keeping students impacted by lessons and focused on their schoolwork, it is important to create an organized learning environment that gives clear expectations. Teachers should consider implementing a flipped classroom method in order to keep students better engaged during lessons while providing them with core knowledge within their learning management system. The flipped classroom is acknowledged as a successful approach for encouraging student-centered learning through engagement (Huang et al., 2022). A mixed-methods quasi-experimental design was used in Huang's et al. study (2022). A control group learned through the flipped classroom method, and the experimental group learned through the flipped classroom method with the integration of a business simulation game (BSG).

The control group had 19 female and 5 male students, while the experimental group had 16 female and 8 male students. The study consisted of three 100-minute classes a week for

three weeks. The course that was studied was an entrepreneurship class centered on how to efficiently manage a business. Through the first 6 days of the lessons, both groups of students learned material from the entrepreneurship syllabus through the flipped classroom method. There were videos and slideshows available to both groups on the class' learning management system. The experimental group was introduced to the BSG during this time. On the seventh day, students presented business plans. On the eighth day, students completed posttest questionnaires based on their engagement with the learning. On the ninth day, there were six students selected from the experimental group to complete a 40-70 minute interview about the experiment. Three of the students who were selected for the interview were low achievers in the class, and the other three were high achievers.

The results of this study showed students in the experimental group had higher perceived engagement with the class than compared to the control group. The posttest score for cognitive and emotional engagement also favored the experimental group. The posttest score for critical thinking also was statistically greater in the experimental group, and they were significantly more creative. Overall learning achievement was greater for the experimental group. Most of the interviewees stated that they felt the BSG's interface provided complete functions of business decision making. Most students indicated they had not played a simulation game like this one before, but they were able to draw on concepts from previous business courses to effectively manage the game. Students were more motivated to engage in the learning because of their investment in the game.

The flipped classroom approach can help students and teachers be on the same page more often due to students spending time on researching resources available in their learning

management system. Students retain less than fifty percent of information presented during a traditional fifty-minute lecture (Strelan et al., 2020). The researchers' literature review was centered on how the flipped classroom method was associated with greater academic performance as opposed to traditional teaching. The final number of eligible studies for this review was 198. Results of the literature review showed the flipped classroom method had a moderately positive impact on student achievement, and this was the same across all school age groups. Flipped classrooms had less of an impact when the teacher was the same for traditional and online learning, whereas the students were more engaged if it was somebody different. The vast majority of the studies (Baepler et al., 2014; Mortenson & Nicholson, 2015) reviewed (Strelan et al., 2020) reported that in-class instruction was focused on student-centered activities rather than core knowledge of a topic.

CHAPTER III: DISCUSSION AND CONCLUSION

This chapter discusses and analyzes three main sections of the literature review: technology-based pedagogy, classroom management, and technology use at home.

First, the research found during this literature review uncovered the value technology can bring to many classrooms. Since the COVID-19 pandemic, schools have accelerated their focus on one-to-one device programs, with 90% of schools offering a mobile device to students (Klein, 2021). Technology has become a priority for many schools as the world continues to evolve with it, and teachers have stated they need administrative support to feel more confident in managing their school's digital resources (Otterborn et al., 2018).

Integrating technology into pedagogy can seem like a daunting task for teachers, but it can be made easier with the assistance of dataveillance tools that monitor students' behavior (Kumar et al., 2019). Teachers see the value in technology (Ali, 2019), but feel they should be confident in the tools they introduce to students. Technology has the ability to engage learners, and students can especially benefit from the flipped classroom method as it has been shown to engage learners outside of a traditional classroom (Strelan et al., 2020). Games and simulations are available for some subjects, which proved to be a catalyst in student engagement (Birt et al., 2017, Huang et al., 2022). While the integration of technology has shown to be beneficial to students, teachers have to expect new challenges as well. Students from lower-income families are less likely to be able to complete work outside of the classroom (Vogels et al., 2020), so a flipped classroom method may not impact those students as effectively. Teachers have to do their best to create a learning environment that is welcoming to learners, and this includes their physical environment as well as their online learning management system (Rhode et al., 2017).

A well-managed learning management system has been shown to motivate students to engage more (Huang et al., 2022).

Teachers have been tasked with re-engaging students who were disassociated from traditional learning due to the COVID-19 pandemic. Getting students to engage with a lesson is based entirely on how motivated they are to do so, and teachers need to convince students the subject matter is worth investing time in learning. Students are motivated to engage with a lesson if they feel they are an active participant in the learning, which has been defined by the Self Determination Theory (Deci & Ryan, 2012).

Literature regarding managing technology in the classroom was also reviewed. As schools attempt to immerse students in new technologies, they have to consider how to monitor the behavior of students while using their devices. Teachers can lean on digital tools like GoGuardian to help keep track of problematic behavior (Nichols & Monea, 2022). Data surveillance technologies give teachers an advantage in monitoring school-assigned devices, but they do not mitigate the distractions that cell phones present. Cell phones have the potential to extend learning onto a mobile device, but students have been shown to be dependent on their mobile devices as a way to relieve stress (Gajdics & Jagodics, 2022). Removing cell phones from schools has proven to cause a positive improvement in students' academic achievement (Beland & Murphy, 2016).

Parents are concerned about their children using mobile devices too often (Aladé and Donohue, 2023), but schools have made technology a priority by instituting one-to-one computer programs in the vast majority of public schools (Klein, 2021). Teachers are tasked with challenging students' perceptions of how to use technology efficiently. Students of recent

generations have consistently used technology inside and outside of school, which has contributed to their overall perceived empathy being lower than previous generations (Konrath et al., 2011). There is speculation that everyday use of technology has played a role in the different mindsets across generations, but there is no concrete evidence that it is the sole reason for the decrease in levels of empathy.

With the allowance of cell phones comes the opportunity for students to cyberbully or share inappropriate media during school hours. Classrooms without bans on cell phones have to especially focus on keeping students engaged, and they can do so with the assistance of other technologies (Hoffman & Ramirez, 2018). Many schools do not want to bother with the distractions that cell phones bring. By 2020, the percentage of schools with cell phone bans rose to 77%, according to the National Center for Education Statistics (Walker, 2023). One argument to the inclusion of cell phone usage is that they provide students with opportunities to connect their learning with internet resources or applications that are easily available on their phones, but reality is students often use their phones for distractions that are not relevant to their education (Gajdics & Jagodics, 2022). Providing students with expectations for how they are allowed to use their phones and other devices provides faculty with a framework to lean on when defending disciplinary decisions.

Discovering relevant technology that can be put in the hands of students can be difficult for teachers who are unfamiliar with what is available, which is why receiving training on new programs is advantageous (Suson, 2019). Teachers should not use technology resources without a clear plan prepared for how students should use them responsibly (Ali, 2019);

Otterborn et al., 2018). Teachers need to practice and be comfortable with the technologies they are modeling in order to feel confidence in managing them with large groups of students.

It is up to teachers to manage resources in the digital classroom and be ready for changes. Although students will engage with the internet both during the school day and outside of school, it is important to ask ourselves, as educators, how can we help them use it effectively? In order to help students understand the importance of digital literacy, they first need to connect parallels between the digital world and their reality. Students need to be taught the basics of *digital law*, meaning if something is taken that has value, then it is considered stealing. It is important that when students receive their first school device (such as a laptop or an iPad) they should receive repetitive lessons about cyber secure behavior (Witsenboer et al., 2022). Students may not fully understand the consequences of not being safe online, which is why it is important to have these sorts of instructions early in a child's development, like in elementary school.

Teachers can teach the principles of digital citizenship to their students and model how to safely use the internet, but it will all be moot if they are not practiced at home. School districts must inform parents of what guidelines they are providing for students when going online. It is ultimately the parents' responsibility to determine what is appropriate for their child to engage with online, and if they can be on the same page with their child's school then it can be a smoother learning process for all parties.

Schools have tried to teach students the values in being safe online and acting as a responsible digital citizen. Hollandsworth's study (2011) showed 86% of respondents taught students proper safe internet behavior, while only 37% continued this education with parents.

Teaching the concepts of digital citizenship, policies and procedures are created by school districts to maintain some level of control over how their students interact with the digital world, but these practices are not often maintained once students step off of school grounds. While teachers are expected to teach students proper behavior on the internet, they can only do so much to impact a student's online decision making. Consistent training and reminders are essential for children to learn what is not only acceptable, but what is best for their own safety. Teachers who want to implement a flipped classroom method will likely find that students from lower-income families will be harder to engage outside of a traditional classroom setting (Vogels et al., 2021). There were heightened concerns during the COVID-19 pandemic in regard to students accessing online resources at home, but there will always be factors that impact household decision-making in regard to technology usage.

Students are becoming more connected to the digital world each day, while at the same time not often making genuine connections with their peers in person (Konrath et al., 2011). It is up to teachers to manage workflow with the learning management system for students to become motivated to engage with in-class activities. Teachers should communicate with parents to share what knowledge they have shared with students and how they can use it at home. It is up to all parties to practice responsible behavior with technology, whether it be students, parents, teachers, or administrators. Creating and following clear guidelines for technology usage can bring everyone on the same page with the goal to advance learning.

Professional Application

Teachers are existing in, arguably, the most technologically advanced time in history, and the intensity is likely to increase as new trends are discovered. Teachers should consider

utilizing data surveillance programs so they can better understand how students are academically progressing. Using these programs can give teachers some insight into how individual students are grasping learning targets. Technology presents new possibilities for students to connect with their learning, and it allows for teachers to monitor their students more efficiently. Given that many schools are requiring their students to utilize a school-issued device, it is important for teachers to be experts in modeling the effective use of them. Teachers have many opportunities to integrate technology into their lesson plans, which can often enrich students' learning.

Using technology continues to be a challenge for teachers as new AI generative software and other programs are invented. Self Determination Theory proved to integrate efficiently into an artificial intelligence course (Xia et al., 2022) based on frameworks for learning proposed by Chiu (2021). There are benefits and challenges (Pedro et al., 2019) to include artificial intelligence in education. Teachers can benefit from AI because of its ability to automate tasks like lesson planning, grading, or provide feedback (Bryant et al., 2020). Automated technology gives teachers more time to work on instructing and engaging students.

Teachers can hope their students will be the most attentive learners they can be, but reality often is that there is a push and pull between teachers and students with their technology usage. It is important that teachers create clear expectations for how technology will be used in the classroom, and they should recommend that students follow many of the online techniques they learned in school. Teachers should take this further by connecting with parents frequently with the assistance of technological tools. Video conferencing has become a

more widely accepted method of connecting as it allows parents and teachers to meet face-to-face while minimizing disruptions to families' schedules.

Teachers should make it a goal to use technology to make their classrooms more organized and interactive. They can do this by hosting a variety of resources in their learning management system, and by creating clear expectations for how students will use technology throughout a course. Teachers are often required to manage an online learning management system, which needs to be easy for parents to access so they can help their children stay accountable. Teachers can try to include games or simulations that keep students engaged while building on concepts they have previously learned (Huang et al., 2022). Teachers should provide students with relevant resources in a flipped classroom method so that during class students are primed to interact with an activity. It is essential to model the effective use of digital tools while recognizing that students will search for shortcuts to their education, especially with the assistance of new resources available to them. Monitoring students' progress can be easier with the assistance of technology. Rather than shunning the existence of new digital tools, teachers should explore what technology students are interested in, and try to integrate them responsibly.

Schools institute data surveillance programs to monitor academic progress and problematic behavior (Nichols & Monea, 2022). Teachers are able to keep students more engaged with the assistance of surveillance tools like GoGuardian. Teachers are notified by the program if a student is doing something not relevant to learning. There is also the ability to pause activity on a device while the program is in session, which may be useful when a student is being disruptive and there needs to be an intervention.

With the ability to monitor students' webcams (Gares et al., 2020), it is not a matter what information schools can find on students, it is a question of how far they are willing to go for new data. Schools are concerned with keywords students type that have been proven to be related to suicide or depression. Schools recognize that students who show signs of these behaviors may struggle in their academics and require intervention. Schools have the ability to contact parents as a preventative measure with the student's best interests in mind.

Schools have always had to keep an eye out for plagiarism, especially as new technologies make cheating easier to do. Teachers should be eager to understand how students are manipulating their assignments so adjustments can be made. Teachers cannot fix an issue if they are not aware of the cause, and being blindly ignorant to how students are using technology in the classroom does not help student learning. Using data surveillance technology has become effective in tracking students' misbehavior, and academic performance. Schools place heavy scrutiny on new technologies, but they are interested in understanding how digital trends can be used to improve education while minimizing the unethical activities some students choose to explore.

In 2023, Ohio, Colorado, Maryland, Connecticut, Pennsylvania, Virginia, and California have all chosen to ban cell phones in school. Cell phones are not currently banned in Minnesota schools, but now that 77% have banned them (Walker, 2023), Minnesota could soon follow the trend. This has implications for teachers, administrators, parents, and students. Teachers would be able to provide clear expectations for cell phone usage with immediate consequences if expectations were not followed. Administrators would likely hear about concerns from parents

who want to have a guaranteed way to contact their child, especially in the instance of an emergency. Teachers should react positively to this trend, but with caution.

Removing cell phones from classrooms has shown a positive correlation with students' grades improving (Beland & Murphy, 2016). This crucial effect has been a major factor in why schools are motivated to adopt a phone ban policy. It is likely that some students would not accept a cell phone ban as easily as others. Administrators would be busy with students who are caught not following the law, which holds a lot more ground than telling someone that they are not following a rule. With a law in place, the majority of students would likely adhere to the ruling eventually, and that would eliminate the biggest distraction students have available to them. Teachers would need to monitor students' behavior with finer detail to ensure they are focusing on their academic progress.

With a focus on Self Determination Theory (Deci & Ryan, 2012), teachers can utilize technologies that are engaging to learners.

Limitations of the Research

All research has limitations which provide opportunities for future research. Specific information on the MN phone ban could not be located, so future research should be conducted so more can be learned about this topic. Specific information on school policies about banning phones could not be located, so future research should discover how phone bans are being implemented in school districts across the US.

Additionally, limited information exists on how students are practicing digital citizenship at home, so it would be helpful if future research could explore how students behave online

outside of school. More detailed studies regarding digital citizenship would be beneficial in uncovering how schools can better manage those efforts.

There is also limited information on how students have adapted in a post-COVID learning environment. Because of this, researchers should spend time discovering how students' performance and behavior was impacted by the COVID-19 virus that shifted schools to online learning. Researchers should focus on the perceptions of academic achievement in relation to delayed learning caused by COVID-19.

Another limitation of this research study is that it focused mainly on technology issues that are important to principals, or what principals perceive are the most important in order to advertise their schools (Dodson, 2020). Future research should be focused on multiple parties of the learning process, including teachers, parents, and students. Researchers should search for credible sources that have academic achievement as a focus in their studies.

Implications for Future Research

Implications for future research suggest that researchers should find new information regarding the impact of cell phones and other technology in schools. Future researchers should be prepared for new technologies and social media advancements that could affect education. Prior research has shown students are susceptible to depression, which is something that should be focused on as they acclimate into society. Future research may find more evidence of how social media trends have impacted the physiological effects of students. Schools will continue to prioritize the integration of technology in classrooms because, partly, of the many technology-based careers that are now available in the labor market. Schools believe it is their

responsibility to prepare students for these opportunities, knowing it is likely there will be classes in the future that are not in curriculum yet.

Students' interest in a class is heavily influenced by their involvement in the learning process. Researchers should continue to be focused on how students are connecting to their learning. It will be important to find how students are relating their learning to their future workplace. Future research could uncover how students of this generation end up adapting into society. The type of skills students are developing now will lead them into new jobs that exist because of technology, or they will be in a career that is evolving with technology.

Many students are focused on their self-identity, especially in their teenage years, and they interact with technology in ways that pique their interests. In the future, it would be helpful to have more data describing how teenagers process information with the assistance of technological resources. School use of dataveillance technologies to highlight student concerns will provide researchers with new insights on how these technologies impact learning. Finally, researchers will be interested in learning how new technology could provide opportunities for teachers to advance learning and minimize distractions.

Conclusion

The purpose of this thesis was to identify how teachers can manage the safe and responsible use of electronic technology resources in the classroom while influencing students to practice the same behavior outside of school. The guiding questions were: How can teachers manage the responsible use of electronic technology resources in the classroom? How can schools influence parents to model responsible digital technology usage at home?

How effectively teachers manage technology in their classrooms can greatly determine the overall knowledge students retain (Strelan et al., 2020). Often, games or simulations can be used to connect a lesson to something that feels real to students (Huang et al., 2022). According to Self Determination Theory (Deci & Ryan, 2012), students will be more connected to their learning if they feel it is related to something relevant, and that they are in control of their learning progress. Teachers can provide those types of learning opportunities with the integration of technology, but they must have a plan. Some students have expertise in certain technologies before a teacher introduces them. It is imperative that teachers develop experience with various technologies.

Teachers have to be ready for new technologies of all kinds, including mobile innovations that attract students. Students will attempt to engage socially with their peers in ways that are not conducive to learning. Knowing how well technology resonates with students presents teachers with the chance to utilize it strategically, if they know how to do so. As technology continues to advance, teachers are presented with new ways to improve student achievement.

References

- Adekanmbi, O., Adekanmbi, M. A., Adekanmbi, M. O., & Adekanmbi, O. O. (2022, October). Algorithmic teenagers' depression detection on social media and automated instant engagement using therapy bot powered by multimodal deep learning and psychotherapy intervention. In *empowering communities: A Participatory Approach to AI for Mental Health*. <https://openreview.net/pdf?id=ZbUWvrRHWtD>
- Ahmad, M., Karim, A. A., Din, R., & Albakri, I. S. M. A. (2013). Assessing ICT competencies among postgraduate students based on the 21st century ICT competency model. *Asian Social Science*, 9(16), 32. <http://dx.doi.org/10.5539/ass.v9n16p32>
- Akram, W., & Kumar, R. (2017). A study on positive and negative effects of social media on society. *International Journal of Computer Sciences and Engineering*, 5(10), 351-354. <https://doi.org/10.26438/ijcse/v5i10.351354>
- Aladé, F., & Donohue, T. H. (2023). Exploring parents' technology attitudes and practices in the context of school-issued one-to-one devices in kindergarten. *Journalism and Media*, 4(2), 547-563. <https://www.mdpi.com/2673-5172/4/2/34>
- Ali, W. (2019). The efficacy of evolving technology in conceptualizing pedagogy and practice in higher education. *Higher Education Studies*, 9(2), 81-95. <https://doi.org/10.5539/hes.v9n2p81>
- Alia, M. A., Tamimi, A. A., & Al-Allaf, O. N. (2013). Integrated system for monitoring and recognizing students during class session. *The International Journal of Multimedia & Its Applications*, 5(6), 45. 10.5121/ijma.2013.5604

- Alias, N. A., & Zainuddin, A. M. (2005). Innovation for better teaching and learning: Adopting the learning management system. *Malaysian Online Journal of Instructional Technology*, 2(2), 27-40.
<https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=d5f63457fb7c53eb83bd2149d860753c3ebca662>
- Baepler, P., Walker, J. D., & Driessen, M. (2014). It's not about seat time: Blending, flipping, and efficiency in active learning classrooms. *Computers & education*, 78, 227-236.
<https://doi.org/10.1016/j.compedu.2014.06.006>
- Bah, S. M., & Ming, F. (2020). An improved face recognition algorithm and its application in attendance management system. *Array*, 5, 100014.
<https://doi.org/10.1016/j.array.2019.100014>
- Balt, E., Mérelle, S., Robinson, J., Popma, A., Creemers, D., van den Brand, I., Van Bergan, D., Rasing, S., Mulder, W., & Gilissen, R. (2023). Social media use of adolescents who died by suicide: Lessons from a psychological autopsy study. *Child and Adolescent Psychiatry and Mental Health*, 17(1), 48. <https://link.springer.com/article/10.1186/s13034-023-00597-9>
- Barkley, T. (2023). What should policymakers do about social media and minors?. *The Center for Growth and Opportunity*.
https://www.thecgo.org/wp-content/uploads/2023/01/Social_Media_and_Teens_RIF_v3.pdf
- Beland, L. P., & Murphy, R. (2016). Ill communication: Technology, distraction & student performance. *Labour Economics*, 41, 61-76.

<https://pdf.sciencedirectassets.com/271673/1-s2.0-S0927537116X0005X/1-s2.0-S0927537116300136/main.pdf>

Birt, J., Moore, E., & Cowling, M. (2017). Improving paramedic distance education through mobile mixed reality simulation. *Australasian Journal of Educational Technology*, 33(6), 7-12.
<https://ajet.org.au/index.php/AJET/article/view/3596/1493>

Blau, I., Shamir-Inbal, T., & Avdiel, O. (2020). How does the pedagogical design of a technology-enhanced collaborative academic course promote digital literacies, self-regulation, and perceived learning of students?. *The Internet and Higher Education*, 45, 100722.
<https://pdf.sciencedirectassets.com/272103>

Bryant, J., Heitz, C., Sanghvi, S., & Wagle, D. (2020). How artificial intelligence will impact K-12 teachers. Retrieved May, 12, 2020.
<https://www.mckinsey.com/~media/McKinsey/Industries/Public%20and%20Social%20Sector/Our%20Insights/How%20artificial%20intelligence%20will%20impact%20K%2012%20teachers/How-artificial-intelligence-will-impact-K-12-teachers.pdf>

Buckingham, D. (2006, December). Defining digital literacy. *Nordic Journal of Digital Literacy*, 1(4), 263-277. <https://www.idunn.no/doi/10.18261/ISSN1891-943X-2006-04-03>

Carstens, K. J., Mallon, J. M., Bataineh, M., & Al-Bataineh, A. (2021). Effects of technology on student learning. *Turkish Online Journal of Educational Technology*, 20(1), 105-113.
<https://files.eric.ed.gov/fulltext/EJ1290791.pdf>

Clarke, R. (1988). Information technology and dataveillance. *Communications of the ACM*, 31(5), 498-512. <https://dl.acm.org/doi/pdf/10.1145/42411.42413>

- Chiu, T. K. (2021). Digital support for student engagement in blended learning based on self-determination theory. *Computers in Human Behavior*, *124*, 106909.
<https://pdf.sciencedirectassets.com/271802>
- Ch, D. (2023, June 14). *TikTok users and growth statistics (2023)*. SignHouse.
<https://www.usesignhouse.com/blog/tiktok>
- Dawson, K., Cavanaugh, C., & Ritzhaupt, A. D. (2008). Florida's EETT leveraging laptops initiative and its impact on teaching practices. *Journal of Research on Technology in Education*, *41*(2), 143-159. <https://files.eric.ed.gov/fulltext/EJ826090.pdf>
- Davis, M. H. (1983). Measuring individual differences in empathy: Evidence for a multidimensional approach. *Journal of personality and Social Psychology*, *44*(1), 113.
<https://student.cc.uoc.gr/uploadFiles/179-%CE%9A%CE%A8%CE%92364/Davis1983.pdf>
- Dawson, S., McWilliam, E., & Pei-Leng Tan, J. (2008). *Teaching smarter: How mining ICT data can inform and improve learning and teaching practice* (thesis). University of Wollongong, Wollongong, AU.
<https://ro.uow.edu.au/cgi/viewcontent.cgi?article=1145&context=medpapers>
- Deci, E. L., & Ryan, R. M. (2012). Self-determination theory. *Handbook of theories of social psychology*, *1*(20), 416-436.
https://psikologi.unmuha.ac.id/wp-content/uploads/2020/02/SAGE-Social-Psychology-Program-Paul-A.-M.-Van-Lange-Arie-W.-Kruglanski-E-Tory-Higgins-Handbook-of-Theories-of-Social-Psychology_-Volume-One-SAGE-Publications-Ltd-2011.pdf#page=437

- Deci, E. L., & Ryan, R. M. (2020). Intrinsic and extrinsic motivation from a self determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology*, 61, 101860.
<https://pdf.sciencedirectassets.com/272424/1-s2.0-S0361476X20X00026/1-s2.0-S0361476X20300254/main.pdf>
- Dewing, M. (2010). Social media: An introduction (Vol. 1). *Ottawa: Library of Parliament*.
<https://bdp.parl.ca/staticfiles/PublicWebsite/Home/ResearchPublications/InBriefs/PDF/2010-03-e.pdf>
- Dodson, R. (2020). An analysis of public school principals' perceptions of social media, computer and smartphone use in schools in eight US states. *Educational Research Quarterly*, 44(1), 3-34.
<https://www.proquest.com/docview/2449279696/fulltextPDF/32D1B10D8546439CPQ>
- Felisoni, D. D., & Godoi, A. S. (2018). Cell phone usage and academic performance: An experiment. *Computers & Education*, 117, 175-187.
<https://pdf.sciencedirectassets.com/271849/1-s2.0-S0360131517X00110/12324/main.pdf>
- Fingal, J. (2021, October 12). The 5 competencies of digital citizenship. *ISTE*.
<https://www.iste.org/explore/5-competencies-digital-citizenship>
- Foulger, T. S., Graziano, K. J., Schmidt-Crawford, D., & Slykhuis, D. A. (2017). Teacher educator technology competencies. *Journal of Technology and Teacher Education*, 25(4), 413-448.
<https://www.learntechlib.org/p/181966/>

- Frau-Meigs, D., O'Neill, B., Soriani, A., & Tomé, V. (2017). Digital citizenship education: Volume 1: Overview and new perspectives. *Council of Europe*.
<https://books.google.com/books?hl=en&lr=&id=eMJUDwAAQBAJ&oi=fnd&pg=PP2&dq>
- Gajdics, J., & Jagodics, B. (2022). Mobile phones in schools: With or without you? Comparison of students' anxiety level and class engagement after regular and mobile-free school days. *Technology, Knowledge and Learning, 27*(4), 1095-1113.
<https://link.springer.com/article/10.1007/s10758-021-09539-w>
- Gares, S. L., Kariuki, J. K., & Rempel, B. P. (2020). Community matters: Student–instructor relationships foster student motivation and engagement in an emergency remote teaching environment. *Journal of Chemical Education, 97*(9), 3332-3335.
https://pubs.acs.org/doi/pdf/10.1021/acs.jchemed.0c00635?casa_token=mYjmoZXHZMkAA
- Gilakjani, A. P. (2014). A detailed analysis over some important issues towards using computer technology into the EFL classrooms. *Universal Journal of Educational Research, 2*(2), 146-153. <https://files.eric.ed.gov/fulltext/EJ1053898.pdf>
- Gray, L., & Lewis, L. (2021). Use of Educational Technology for Instruction in Public Schools: 2019-20. First Look. NCES 2021-017. *National Center for Education Statistics*.
<https://nces.ed.gov/pubs2021/2021017.pdf>
- Hitchcock, L. I., Báez, J. C., Sage, M., Marquart, M., Lewis, K., & Smyth, N. J. (2021). Social work educators' opportunities during COVID-19: A roadmap for trauma-informed teaching during crisis. *Journal of Social Work Education, 57*(sup1), 82-98.
<https://d1wqtxts1xzle7.cloudfront.net/69641682/10437797.2021-libre.pdf>

- Hobbs, T., Barry, R., & Koh, Y. (2021). The Corpse Bride Diet!: How TikTok inundates teens with eating-disorder videos. *The Wall Street Journal*.
<https://www.house.mn.gov/comm/docs/w8cOnyZ3ZUKtRrspUZ0NFg.pdf>
- Hoffmann, M. M., & Ramirez, A. Y. (2018). Students' attitudes toward teacher use of technology in classrooms. *Multicultural Education*, 25(2), 51-56.
<https://files.eric.ed.gov/fulltext/EJ1181619.pdf>
- Hollandsworth R., Dowdy L., & Donovan J. (2011). Digital citizenship in K-12: It takes a village. *TechTrends*, 55(4), 37-47. <https://heartofschool.greenschool.2019-11-06.pdf>
- Huang, Y. M., Silitonga, L. M., & Wu, T. T. (2022). Applying a business simulation game in a flipped classroom to enhance engagement, learning achievement, and higher-order thinking skills. *Computers & Education*, 183, 104494.
<https://pdf.sciencedirectassets.com/271849/1-s2.0-S0360131522X00031/1-s2.0-S0360131522000653/main.pdf>
- ISTE standards: Students. (n.d.) *ISTE*. <https://www.iste.org/standards/iste-standards-for-students>
- Kao, J., & Gillum, J. (2020). Reverse-engineering an audio aggression detection algorithm. *ProPublica, Computational Journalism Symposium*.
https://bpb-us-w2.wpmucdn.com/sites.northeastern.edu/dist2020_paper_52.pdf
- Kiema, K. I. N. J. O. (2015). As schools lift bans on cell phones, educators weigh pros and cons. *NEA Today*. <http://rudderresponse.pbworks.com/w/file/fetch/10%20Nov%202022.pdf>
- Klein, A. (2021). During COVID-19, schools have made a mad dash to 1-to-1 computing. What happens next. *Education Week*.

<https://www.edweek.org/technology/during-covid-19-schools-have-made-a-mad-dash-to-1-to-1-computing-what-happens-next/2021/04>

Koenig, A. (2020). The algorithms know me and I know them: Using student journals to uncover algorithmic literacy awareness. *Computers and Composition*, 58, 102611.

<https://pdf.sciencedirectassets.com/koenigab>

Konrath, S. H., O'Brien, E. H., & Hsing, C. (2011). Changes in dispositional empathy in American college students over time: A meta-analysis. *Personality and Social Psychology Review*, 15(2), 180-198.

https://journals.sagepub.com/doi/pdf/10.1177/1088868310377395?casa_token=XX-YYEjOsggAAAAA:q-qXHDdrWEgFL7Pkv_FdXXRfpayWBbSepd5razP9I9LI0tqE-283AP4AGhZDiRHahmoeJTjefiw

Kumar, P. C., Vitak, J., Chetty, M., & Clegg, T. L. (2019). The platformization of the classroom: Teachers as surveillant consumers. *Surveillance & Society*, 17(1/2), 145-152.

<https://ojs.library.queensu.ca/index.php/surveillance-and-society/article/view/12926/8488>

Lantz-Andersson, A., Peterson, L., Hillman, T., Lundin, M., & Rensfeldt, A. B. (2017). Sharing repertoires in a teacher professional Facebook group. *Learning, Culture and Social Interaction*, 100(15), 44–55.

<https://pdf.sciencedirectassets.com/280469/1-s2.0-S2210656117X00056/1-s2.0-S2210656116301532/main.pdf>

- Li, Y., Wang, K., Xiao, Y., & Froyd, J. E. (2020). Research and trends in STEM education: A systematic review of journal publications. *International Journal of STEM Education*, 7(1), 1-16.
<https://doi.org/10.1186/s40594-020-00207-6>
- Licorish, S. A., George, J. L., Owen, H. E., & Daniel, B. (2017). Go Kahoot! Enriching classroom engagement, motivation and learning experience with games. *Asia-Pacific Society for Computers in Education*, in proceedings of the 25th international conference on computers in education (P. 755-764).
<https://www.researchgate.net/profile/Sherlock-Licorish/publication/338888888-Experience-with-Games.pdf>
- Livingstone, S., Stoilova, M., & Nandagiri, R. (2019). Children's data and privacy online: Growing up in a digital age: An evidence review. *The London School of Economics and Political Science*
https://eprints.lse.ac.uk/101282/1/Livingstone_childrens_data_and_privacy_online_research_findings_published.pdf
- Longe, E. (2023, July). Issue commentary / july 2023 keeping teens safe on social media: A guide for freemarket lawmakers. https://jamesmadison.org/wp-content/uploads/IssueCommentary_TeenOnlineSafety_Jul2023-v04-1.pdf
https://jamesmadison.org/wp-content/uploads/IssueCommentary_TeenOnlineSafety_Jul2023-v05.pdf

- Martin, F., Bacak, J., Polly, D., Wang, W., & Ahlgrim-Delzell, L. (2023). Teacher and School Concerns and Actions on Elementary School Children Digital Safety. *TechTrends*, 67(3), 561-571. <https://link.springer.com/article/10.1007/s11528-022-00803-z>
- Miotto, M. B., & Cogan, R. (2023). Empowered or traumatized? A call for evidence-informed armed-assailant drills in US schools. *The New England Journal of Medicine*, 389, 6-8. <https://www.nejm.org/doi/full/10.1056/NEJMp2301804>
- Mortensen, C. J., & Nicholson, A. M. (2015). The flipped classroom stimulates greater learning and is a modern 21st century approach to teaching today's undergraduates. *Journal of animal science*, 93(7), 3722-3731. <https://doi.org/10.2527/jas.2015-9087>
- Musgrove, S. (2023). The Stock Market Game™ Program. *Best Prep*. <https://bestprep.org/the-stock-market-game/>
- Nichols, T. P., & Monea, A. (2022). De-escalating 'dataveillance' in schools. *Phi Delta Kappan*, 104(4), 23–27. <https://static1.squarespace.com/static/59da73f0f6576ed92f1593fa/t/63860b3dd9aa9d1e6d957105/1669729086160/00317217221142978.pdf>
- Otterborn, A., Schönborn, K., & Hultén, M. (2019). Surveying preschool teachers' use of digital tablets: General and technology education related findings. *International Journal of Technology and Design Education*, 29, 717–737. <https://doi.org/10.1007/s10798-018-9469-9>
- Pedro, F., Subosa, M., Rivas, A., & Valverde, P. (2019). Artificial intelligence in education: Challenges and opportunities for sustainable development. <https://hdl.handle.net/20.500.12799/6533>

- Petty, T. M., Heafner, T. L., Farinde, A., & Plaisance, M. (2015). Windows into teaching and learning: Professional growth of classroom teachers in an online environment. *Technology, Pedagogy and Education, 24*(3), 375-388.
<https://www.tandfonline.com/doi/full/10.1080/1475939X.2014.991422>
- Pyle, B., & Esslinger, K. (2014). Utilizing technology in physical education: Addressing the obstacles of integration. *Delta Kappa Gamma Bulletin, 80*(2), 35.
<https://www.proquest.com/docview/1490972794/fulltextPDF/99476A74FEDA4EB5PQ/1?accountid=8593>
- Raja, R., & Nagasubramani, R. R. (2018, March 20). Impact of modern technology in education. *Journal of Applied and Advanced Research, 3*(Sup1), S33-S35.
<https://updatepublishing.com/journal/index.php/jaar/article/view/6790/pdf>
- Ramdani, A., Purwoko, A. A., & Yustiqvar, M. (2021, December). Improving Scientific Creativity of Teacher Prospective Students: Learning Studies Using a Moodle-Based Learning Management System During the COVID-19 Pandemic. In *International Joint Conference on Science and Engineering 2021 (IJCSSE 2021)* (pp. 261-267). Atlantis Press.
10.2991/aer.k.211215.048
- Rapanta, C., Botturi, L., Goodyear, P., Guàrdia, L., & Koole, M. (2021). Balancing technology, pedagogy and the new normal: Post-pandemic challenges for higher education. *Postdigital Science and Education, 3*(3), 715-742.
<https://link.springer.com/article/10.1007/s42438-021-00249-1>

- Reid Chassiakos, Y. L., Radesky, J., Christakis, D., Moreno, M. A., Cross, C., Hill, D., Ameenuddin, N., Hutchinson, J., Levine A., Boyd, R., Mendelson, R., & Swanson, W. S. (2016). Children and adolescents and digital media. *American Academy of Pediatrics, 138*(5), 3.
https://watermark.silverchair.com/peds_20162593.pdf
- Rhode, J., Richter, S., Gowen, P., Miller, T., & Wills, C. (2017). Understanding faculty use of the learning management system. *Online Learning, 21*(3), 68-86.
<https://files.eric.ed.gov/fulltext/EJ1154161.pdf>
- Ribble M., & Northern, T. (2013). Educational leadership in an online world: Connecting students to technology responsibly, safely, and ethically. *Journal of Asynchronous Learning Networks, 17*(1), 137-145. <https://files.eric.ed.gov/fulltext/EJ1011379.pdf>
- Robb, C. A., & Wendel, S. (2023). Who can you trust? Assessing vulnerability to digital imposter scams. *Journal of Consumer Policy, 46*(1), 27-51.
<https://link.springer.com/article/10.1007/s10603-022-09531-6>
- Schrader, D. E. (2015). Constructivism and learning in the age of social media: Changing minds and learning communities. *New Directions for Teaching and Learning, 144*, 23-35.
https://www.researchgate.net/profile/Dawn-Schrader/publication/286903658_Constructivism_and_Learning_in_the_Age_of_Social_Media_Changing_Minds_and_Learning_Communities/links/5aea1181aca2725dabb640bc/Constructivism-and-Learning-in-the-Age-of-Social-Media-Changing-Minds-and-Learning-Communities.pdf

- Shu, K., Mahudeswaran, D., Wang, S., Lee, D., & Liu, H. (2020). Fakenewsnet: A data repository with news content, social context, and spatiotemporal information for studying fake news on social media. *Big Data*, 8(3), 171-188. <https://arxiv.org/pdf/1809.01286.pdf>
- Strelan, P., Osborn, A., & Palmer, E. (2020). The flipped classroom: A meta-analysis of effects on student performance across disciplines and education levels. *Educational Research Review*, 30, 100314. <https://pdf.sciencedirectassets.com/273542/1-s2.0-S1747938X20X00029/1-s2.0-S1747938X19301599/main.pdf>
- Suson, R. L. (2019). Appropriating digital citizenship in the context of basic education. *International Journal of Education, Learning and Development*, 7(4), 44-66. <https://www.eajournals.org/wp-content/uploads/Appropriating-Digital-Citizenship-in-the-Context-of-Basic-Education-1.pdf>
- Swart, J. (2021). Experiencing algorithms: How young people understand, feel about, and engage with algorithmic news selection on social media. *Sage Journals*, 7(2), 1-11. <https://journals.sagepub.com/doi/epub/10.1177/20563051211008828>
- Tamayo, Peter (2016). Report to the Legislature Digital Citizenship Recommendations." *OSPI* https://imature.in/downloads/OSPI_Washington_State_Digital_Citizenship_Recommendations.pdf
- Thacker, A., Ho, J., Khawaja, A., & Katz, L. (2021). Peer-to-peer learning: the impact of order of performance on learning fundamental movement skills through video analysis with middle school children. *Journal of Teaching in Physical Education*, 41(4), 622-632. <https://journals.humankinetics.com/view/journals/jtpe/41/4/article-p622.xml>

- Torres, C. E., D'Alessio, S. J., & Stolzenberg, L. (2020). The effect of social, verbal, physical, and cyberbullying victimization on academic performance. *Victims & Offenders, 15*(1), 1-21.
<https://doi.org/10.1080/15564886.2019.1681571>
- Vogels, E., Perrin, A., Rainie, L., & Anderson, M. (2020). 53% of Americans say the internet has been essential during the covid-19 outbreak: Americans with lower incomes are particularly likely to have concerns related to the digital divide and the digital homework gap". Pew Research Center.
https://www.pewresearch.org/internet/wp-content/uploads/sites/9/2020/04/PI_2020.04.30_COVID-internet_REPORT.pdf
- Walker, T. (2023, February 3). Cellphone bans in school are back. How far will they go?. *National Education Association*.
<https://www.nea.org/advocating-for-change/new-from-nea/cellphone-bans-school-are-back-how-far-will-they-go>
- Wallace, J., & Scanlon, D. (2022). Digital technology and teacher digital competency in physical education: A holistic view of teacher and student perspectives. *Curriculum Studies in Health and Physical Education, 1-4*.
<https://www.tandfonline.com/doi/epdf/10.1080/25742981.2022.2106881?needAccess=true&role=button>
- Witsenboer, J. W. A., Sijtsma, K., & Scheele, F. (2022). Measuring cyber secure behavior of elementary and high school students in the Netherlands. *Computers & Education, 186*, 104536.

<https://pdf.sciencedirectassets.com/271849/1-s2.0-S0360131522X00067/1-s2.0-S0360131522001075/main.pdf>

- Xia, Q., Chiu, T. K., Lee, M., Sanusi, I. T., Dai, Y., & Chai, C. S. (2022). A self-determination theory (SDT) design approach for inclusive and diverse artificial intelligence (AI) education. *Computers & Education*, 189, 104582. <https://doi.org/10.1016/j.compedu.2022.104582>
- Yu, Z., Gao, M., & Wang, L. (2021). The effect of educational games on learning outcomes, student motivation, engagement and satisfaction. *Journal of Educational Computing Research*, 59(3), 522-546. <https://journals.sagepub.com/doi/epub/10.1177/0735633120969214>
- Zheng, B., Warschauer, M., Lin, C. H., & Chang, C. (2016). Learning in one-to-one laptop environments: A meta-analysis and research synthesis. *Review of Educational Research*, 86(4), 1. <https://journals.sagepub.com/doi/pdf>