Teacher Perceptions of Technology in the Elementary Classroom

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Given the multitude of technological options teachers possess to further their students' learning, limited research has been conducted to understand teachers' perceptions of the use of technology by students within the classroom. As Ciampa (2014) states, "There is little understanding of what it is that makes learning with mobile devices so engaging and motivating to use" (p. 82). Intrinsic motivation for learning plays a significant role in the use of technology within the classroom, but we have yet to understand the correlations. Intrinsic factors such as challenge, curiosity, and control, as well as extrinsic factors such as cooperation, competition, and recognition, have been identified as motivational factors within educational environments and can be tied to learning through the use of technology (Ciampa, 2013). Employing the theoretical lens of Ryan and Deci's Self-Determination Theory (SDT) (Deci & Ryan, 1985, 2000; Ryan & Deci, 2017) and resting on a constructivist platform, this collective case study was designed to answer one research question: *How do teachers perceive the impact of technology integration in the classroom in terms of student behavior, learning, and motivation?*

Current research in educational technology regarding the effects of technology on the behavior, learning, and motivation of students is sparse. Few studies address the perceptions of teachers when considering the use of instructional technology. Teachers' perceptions are crucial to the understanding of how technology impacts the classroom, given that they are tasked with implementing and utilizing technology regularly with their students. With a focus on the lived experiences of teachers and technology, their perceptions surrounding the use of educational technology within the classroom, and the teacher-perceived impacts on student behavior, learning, and motivation, this present research has the potential to inform teachers and administrators about the growing dependence on technology within classrooms and its perceived impact on the behavior, learning, and motivation of students.

Literature Review
Theoretical Framework

This collective case study rests on a constructivist epistemology and an interpretivist paradigm, both of which guided the investigation and informed data collection and analysis procedures. Constructivism is rooted in the idea that "findings are literally created as the investigation proceeds through interaction between the researcher and the people and objects being researched" (Egbert & Sanden, 2014, p. 35). A constructivist epistemology rejects objective *Truth* (with a capital *T*) and, instead, is based upon the idea that knowledge is constructed by individual experiences, thus *truth* (with a

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lowercase *t*) (Egbert & Sanden).
A paradigm, according to Egbert and Sanden, is "a researcher's specific stance on how knowledge...can be revealed" (2017, p. 32). As is characteristic of the interpretivist paradigm, specifically as employed in this present study, interpretations are recognized as essential to human interactions and knowledge.

Self-determination Theory (Deci & Ryan, 1985, 2000; Ryan & Deci, 2017) establishes that autonomy, competence, and relatedness each help facilitate student self-regulation and motivation for learning. Autonomy refers to the ability for one to self-regulate their behavior. Competence, according to Deci and Ryan (2000), means "to engage optimal challenges and experience mastery or effectance in the physical and social worlds" (p. 252). Relatedness refers to the need for belonging and relationships with others. Teachers are tasked with facilitating a classroom environment that is conducive to fostering the psychological needs of students, including motivation and self-regulation skills. Technology has the potential to change the ways in which students learn and practice self-regulation strategies because teachers may employ behavior management technology and innovative educational enhancements which assist with classroom management and academic instruction.

While grounded in constructivist and interpretivist ideals, the data collection and analysis procedures of this research were rooted in SDT (Deci & Ryan, 1985, 2000; Ryan & Deci, 2017) theoretical framework as it relates to student motivational constructs. The design of the data collection, interview questions specifically, and the data analysis procedures were

based upon the autonomy, competence, and relatedness factors of SDT.

Technology in the Classroom

Availability of technology has increased dramatically over the last three decades, leaving schools struggling to keep up with the fast-paced evolution of technological options available to teachers and students. However, Gee (2012) found that some children are falling behind in school because they lack important technological skills due to the fact that they may not have access to technology or support for its use at school or home. He laments, "What is crucial for a child is not just having access to *digital* media, but also having access to good mentoring around that media" (p. 61). Squire (2008) discussed the future of print media and technology as it relates to learning.

> Books and lectures are not going away. However, there is potential with games to dramatically reconfigure the role that each play. Similar to problem-based learning, games offer opportunities for organizing learning around challenges; however, there is potential with games to give more instantaneous and responsive feedback, to use digital technologies to customize activities to players' goals and interests, to augment learners' thinking with digital tools, and to use such tools to allow learners to think and act creatively (within digital worlds). (p. 18)

Electronic educational games, behavior monitoring software, and instructional technologies each impact the educational landscape and the ways in which students learn and interact with their teachers and peers. Csikszentimihalyi's Flow Theory

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(as cited in Perttula, Kiili, Lindstedt, & Tuomi, 2017), "describes a state of absorption or engagement in a specific activity in which a person excludes all irrelevant emotions and thoughts" (p. 57). The characteristics of the flow experience include: control, awareness of actions, loss of self-consciousness, time distortion, concentration, and intrinsically rewarding feedback from the experience. It is believed that students enter into a state of flow during learning engagement through electronic gaming methods, which allows the experience to become intrinsically motivating. Ideas rooted in Flow Theory align with the motivational constructs of SDT (Deci & Ryan, 1985, 2000; Ryan & Deci, 2017).

Cordova and Lepper (1996) note that the introduction of computers has dramatically enhanced the ability to individualize instruction for students, which impacts student motivational outcomes in the classroom. They found that "presenting learning activities, even those involving abstract operations, in meaningful contexts of some inherent appeal to children should have significant beneficial effects on children's intrinsic motivation and learning" (p. 715). Similarly, Tüzün, Yılmaz-Soylu, Karakuş, et al. (2009) determined that students demonstrated higher intrinsic and lower extrinsic motivation when participating in educational gaming through technology. Similarly, Woo (2013) demonstrated comparable results in the increase in student motivation from digital game-based learning, and Gee (2017) also argued that technology is a way of "teaching, learning, doing, and being" (p. 28). Digital games, according to Gee (2008; 2017), involve problem solving and encompass teaching and learning opportunities. Gee says that "gamers do

not just play their games. When they have a real interest or passion for a game, or a type of game, they often take their game-based learning, ideas, and skills into modern affinity spaces" (2017, p. 29). In alignment with Gee (2008; 2017) and Squire (2008), Papastergiou (2008) had previously found that digital game-based learning had the potential to "render learning of academic subjects more learner-centered, easier, more enjoyable, more interesting, and thus, more effective" (p. 1). Additional research by Barber, Bagsby, Grawitch, and Buerck (2011) focused on student self-regulation; these authors discovered that feedback, such as that from online learning technologies, may enhance a student's self-regulatory behaviors which play into motivation when it comes to learning. Proulx, Romero, and Arnab (2017) agree that digital learning does have the potential to encourage motivation if the activity meets certain requirements of maintaining the autonomy, competence, and relatedness components of SDT (Deci & Ryan, 1985, 2000; Ryan & Deci, 2017) and aligns with the learning goals of the student.

Research regarding learning in online contexts is limited in both quantity and scope (Harnett, St. George, & Dron, 2011). Regarding learning theory, Weiler (2004) noted that "educators are already painfully aware, students will only seek information and learn if they are motivated to do so. The difficult part is to discover the answer to the age-old question of what motivates students" (p. 48). Ciampa (2014) uncovered that "challenge and immediate feedback played a significant role in making mobile apps and games engaging, enjoyable, and motivating for the students...students and teachers commented that the immediate feedback encouraged many students to

keep working on difficult problems" (p. 88). Barab, Gresalfi, and Ingram-Goble (2010) researched the ways by which children learn through video gaming and found "videogames are a powerful medium in which curriculum designers can create new worlds that invite youth to become scientists, doctors, writers, mathematicians" (p. 525). Squire (2008) warned, "If educators do not embrace these technologies - and most importantly the principles underlying their operation - we risk creating a new equity gap that will only amplify the existing inequities in education" (p. 17). There is a necessity to understand how teachers perceive the impact of technology within their classrooms, as they are tasked with implementing the technology and balancing it with live instruction to provide a quality learning environment for their students. As Squire, Gaydos and DeVane (2016) espoused, "New technologies afford opportunities not just to meet old learning goals more effectively, efficiently, or in more appealing ways, but also to support, and even suggest new goals" (p. 4).

Methodology

This qualitative collective case study was designed to answer one research question: How do teachers perceive the impact of technology integration in the classroom regarding student behavior, learning, and motivation? Case study research is defined as "the study of the particularity and complexity of a single case, coming to understand its activity within important circumstances" (Stake, 1995, p. 1). It involves the study of a bounded system or systems through detailed analysis and data collection within the real-life context of the participants (Creswell, 2013). Case study is often used by researchers when they want to understand a behavior or activity, with little focus on "establishing definitive and replicable truths" (Egbert & Sanden, 2014, p. 80). In a collective case study, the researcher selects one issue to explore and finds multiple sources or cases to study to "illustrate the issue" (Creswell, 2013, p. 99).

Participants

Participants were chosen by purposeful selection to represent the three different cases which informed this collective case study. Purposeful selection involves selecting individuals from a particular site to participate because they can "best help us understand our phenomenon" (Creswell, 2014, p. 206). Purposeful sampling offers the opportunity to gain differing perspectives on the issue at hand (Creswell, 2013). The Florida K-8 charter school described in this study was chosen due to its high level of technology use within its classrooms and the integrative curriculum utilized within the elementary program. To be chosen for the study, participants needed to be certified teachers, currently teaching at the elementary level within the site; three such teachers were selected.

An announcement of the study was emailed to all teachers by the Principal of the research site to attract participants. Interested teachers filled out volunteer forms and emailed the researcher directly, expressing their interest. The first three volunteers were emailed by the researcher to verify their teaching credentials, position, and interest in participation. Meanwhile a waiting list of additional interested teachers was maintained. When the first three respondents confirmed their interest to participate in the study, each were emailed a consent form to complete. Once consent forms were collected, each participant was contacted individually via email to schedule

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an interview, artifact collection, and observation times. Two days before the planned research times, each participant was sent an email reminder of their scheduled time slot. On the day of each interview, artifact collection, and observation, another email was sent to remind each participant of the time and place of the meeting. All interviews, artifact collections, and observations took place in-person, as scheduled.

At the time of this research, one participant taught kindergarten, another taught second grade, and the third taught fourth-grade science and social studies within a team-teaching dynamic. The first participant was Ryan. During this study, Ryan was in her fifth year of teaching in the elementary grades. She had previously taught fifth grade in another state and was immersed in her first year of teaching fourth-grade reading and science at the research site. The second participant, Ingrid, began her teaching career seven years prior at the research site. She started her career as a permanent substitute teacher, next became a Spanish teacher, and then five years ago was hired full-time as a fourth-grade reading and language arts teacher. Ingrid was in her second year of teaching second grade at the time of this research. April, the third participant, had over seventeen years of experience in the classroom at time of this study. She had taught kindergarten, first grade, a kindergarten and first grade mixed-age class, and fourth grade. April also had extensive past teaching experience working with children diagnosed with autism spectrum disorders. During the study, April was in her fifth year of teaching kindergarten at the site. See Table 1 for participant profiles.

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Table 1

Participant Profiles

Participant	Grade Level	Years of Teaching Experience	Classroom Technology Used Regularly
Ryan	Fourth	5	• Teacher laptop computer • Interactive SmartBoard • Student Chromebooks • Google • Free Rice (online game to motivate students through positive reinforcement)
Ingrid	Second	7	• Teacher laptop computer • Interactive SmartBoard • Student laptop computer • Class Dojo (online behavior system) • Student iPads
April	Kindergarten	18	• Teacher laptop computer • Interactive SmartBoard • Various educational apps for SmartBoard • YouTube for storytelling • Student iPads • Student Chromebooks

Assessments and Measures

The data was collected over one week during the fall term via artifacts, classroom observations, and semi-structured interviews. Throughout the research process, I reviewed artifacts to understand the technology available to the teacher and the ways in which the teacher was instructed to use the available technology through the curriculum. As Yin (2009) asserted, "The most important use of documents (in case study research) is to corroborate and augment evidence from other sources" (p. 103); Therefore, artifacts collected and reviewed included curriculum materials and technology inventories from each classroom.

In complete participant observation, "the researcher is fully engaged with the people he or she is observing. This may help him or her establish greater rapport with the people being observed" (Creswell, 2013, p. 166). In order to assess the available technology and understand the educational setting, I was a participant observer who immersed in the classroom environment, interacted with the teacher during observations, asked clarification questions, and engaged in casual dialogue about the classroom use of technology and its perceived impact on students. While

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observing, the teachers shared artifacts with me such as classroom technology inventories and curriculum materials which encouraged the use of technology.

Semi-structured interviews contain a mix of more and less structured questions and allow for flexibility with all questions (Merriam & Tisdell, 2016). The questions are guided by a list predetermined by the researcher with no exact wording or order for the questions (Merriam & Tisdell, 2016). Semi-structured interviews with each teacher lasted approximately 30-60 minutes per participant. Interviews were scheduled over a period of three days, with one interview scheduled per day. Each of the three participants chose to meet individually with me in their classrooms, which were private, designated areas, either during their planning periods or after school hours.

Throughout the interview process, I focused on questions related to their perceptions of the integration and use of technology within their classrooms, as well as their perceptions of student behavior, learning, and motivation in regard to the use of technology. Self-determination Theory (Deci & Ryan, 1985, 2000; Ryan & Deci, 2017), as tied to student motivational constructs, was used to inform pertinent interview questions. I began each interview by collecting background information about the participants' teaching experience and asked for descriptors of their current classrooms. Next, we discussed the use of technology in their classroom. Finally, I asked questions related to the teachers' perceptions of how technology within the classroom affected student behavior, learning, and motivation. At the end of the interview, each participant was given the opportunity to discuss anything which we had not previously addressed. Throughout all of the conversations the participants appeared happy to share their thoughts and ideas related to their perceptions of the impact of technology on their students' behavior, learning, and motivation.

Data Analysis

Notes from artifact reviews, classroom observations, and interview transcripts were examined and organized into a single spreadsheet to be coded. "A code in qualitative inquiry is most often a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language based or visual data" (Saldaña, 2016, p. 4). With SDT (Deci & Ryan, 1985, 2000; Ryan & Deci, 2017) as the theoretical framework for this research, data was analyzed through the lens of student well-being and motivation, and the nuances of the classroom experiences of individual participants were taken into account.

Affective coding methods were used as the first cycle coding methodology with which to analyze the data. "Affective coding methods investigate subjective qualities of human experience (e.g. emotions, values, conflicts, judgements) by directly acknowledging and naming those experiences" (Saldaña, 2016, p. 124). Affective methods include emotion coding, values coding, versus coding, and evaluation coding. Since the present research focused on the perceptions, values, and thoughts of the participants, values coding was used to code the of participants' beliefs regarding technology use within their classrooms. As Saldaña (2016) stated, "Values coding is the application of codes to qualitative data that reflect a participant's values, attitudes, and beliefs, representing his or her perspectives or worldview" (p. 131).

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The second step of coding the data involved mapping the themes that emerged through the values coding using thematic analysis. Boyatzis (1998) defined thematic analysis as "a method for identifying, analyzing, and reporting patterns (themes) within data. It minimally organizes and describes a given data set in rich detail, however, it often goes further than this and interprets various aspects of the research topic" (as cited in Braun & Clarke, 2006, p. 6). Braun and Clarke (2006) defined theme as "something important about the data in relation to the research question, and [something which] represents some level of patterned response or meaning within the data set" (p. 10). Thematic analysis conducted within a constructivist epistemology with an interpretivist paradigm may lead to an understanding of the sociocultural contexts and conditions which allow for the individual accounts investigated in research (Braun & Clarke); in this study specifically, the commonalities and differences of three teachers' perceptions of student behavior, learning, and motivation concerning technology use within the classroom. The following narrative about the participants' perceptions is derived from the collected and coded data from interviews, classroom observations, and artifacts.

Trustworthiness

Lincoln and Guba (1985) discuss "trustworthiness" in terms such as credibility, authenticity, dependability, and confirmability and propose the use of triangulation of sources and prolonged engagement in the field to establish credibility. Also, "the inclusion of multiple cases is, in fact, a common strategy for enhancing the external validity" of a study (Merriam & Tisdell, 2016, p. 40). Triangulation is a strategy used to ensure reliability and validity that involves cross-checking data using multiple data sources (Merriam, 2009; Merriam & Tisdell, 2016). In this study, I used multiple cases and triangulated data by including multiple data sources (artifacts, classroom observations, and semi-structured interviews) which strengthened the validity and reliability of the investigation. Additionally, transcriptions and detailed field notes were cross-referenced, and data was analyzed multiple times to ensure the accuracy of the findings. To respect the participants and ensure the trustworthiness of the research, I attempted not to challenge the teachers' ideas during the collaborative processes of artifact reviews, observations, and interviews.

Findings

Four interwoven themes emerged through data analysis: (a) behavior, (b) learning, (c) motivation, and (d) concerns. All themes were rooted in the theoretical framework of SDT (Deci & Ryan, 1985, 2000; Ryan & Deci, 2017). Teachers discussed technology use in their classrooms as a means by which they strengthened and encouraged student autonomy, competence, and relatedness. These teachers perceived that technology provided motivational constructs for positive behavior and afforded enhanced student learning opportunities. Since behavior is rooted in the SDT constructs of autonomy and relatedness, and learning and motivational factors rest on all three SDT constructs of autonomy, competence, and relatedness, findings suggest direct ties to the theory. Findings suggest that teachers perceive that motivation experienced through the use of technology improves both student behavior and learning. In addition, all three participants

expressed concerns about the use of technology in educational settings.

Theme One: Behavior

Behavior was a strong theme apparent throughout the study. Behavior, as defined for the purposes of this research, included the advertent and inadvertent actions of a person directed towards themselves, others, and their environment. All three teachers commented that technology played a role in the established behavior modification systems within their classrooms. Their perceptions related to the previous work of Ciampa (2014); Cordova and Lepper (1996); Deci and Ryan (1985, 2000); Gee (2008, 2017); and Ryan and Deci (2017). Ingrid, the second-grade teacher, discussed her behavior system during our time together. She uses Class Dojo, which is a digital positive behavior system that rewards students with digital badges for positive behaviors. Ingrid spoke favorably about the use of the app and technology as a reward in her classroom.

> We use Class Dojo, and Dojo is also technology because it links between my phone or my computer and the parent's phone and it is behavior-centered. We tie rewards to the points, so they can cash them in and get a nice little reward. The iPad as a reward motivates them and keeps them on task. If they're having trouble with behavior that particular day the one child doing the right thing they will get five minutes with the iPad as a reward. Everybody else will all of the sudden start behaving when they see the reward.

Ryan teaches fourth-grade science and social studies as a team teacher and uses Chromebooks as a behavior reward in her classroom. She said,

> We also do things called positive points. So, if they did something positive, they would get a point. And if they accumulated a certain number of points, then they could have free time on their Chromebooks. Or there's another game that we will play as a whole class. If everybody got a certain number of points, we would play Free Rice. And so, for every correct answer, the game donates rice to combat world hunger. And then if you got a certain number, then it doubled the amount of rice. They're playing and it's educational, but they're also able to give back to the community.

April, a kindergarten teacher with almost two decades of teaching experience, has witnessed technology emerge and evolve in the classroom over the years. She allows her kindergarten students time with technological devices as a motivator for positive behavior in her classroom. Sharing her thoughts about technology in her classroom, she commented,

> I think technology can be a motivator. If a student is very technology oriented, that's what they like. It could certainly be a motivator that you say, "If you do what you're supposed to do"- especially if they have behavior issues. "If you do these things, then we'll find ten minutes for you to be on the tablet of your choice."

Theme Two: Learning

Another prominent theme discussed by the teachers was student learning and how technology impacts the learning process. Learning is defined by Dewey (1916) as

"the sum total of what is known, as that is handed down by books…It is something external, an accumulation of cognitions…" (p. 335). Within the context of this study, learning is defined as the acquisition or building of knowledge through activity or experience facilitated by the teacher. Teacher participants discussed the customization of learning experiences through technology and their ideas were in alignment with those of Csikszentmihayli (1975); Cordova and Lepper (1996); Gee (2008, 2017); Perttula et al. (2017); Proulx, Romero, and Arnab (2017); Squire (2008); and Squire, Gaydos, and DeVane (2016). Ingrid said,

> The iPad is special because I only have two in my classroom. Everything on the iPad is game-centered so I like to use it for remediation for students who need extra practice. They think they are playing a game, but they are learning as they play.

Ingrid also commented about how the technology she uses within her classroom engages all learning types, which enables her to better able to reach all students. She told the following story.

> I had a student with dysgraphia last year, and he could not write, I mean he's practically a genius, but he couldn't get his words down and we have to grade what's written. We finally figured out if we just give this child a computer and let him type it out, it'll be fine. And he went from D's to straight A's.

Ryan also uses technology to reach children of all learning levels and styles. She said,

With technology, I can give enrichment to some students and give remediation to some students. It's just one-on-one. It's just them. They can move at their own pace. Our society is going more towards technology, that it gives real-world application to these kids. If they're able to type a paper, or do research from more than one different website, or use the different tools that Google has available, that they're going be able to bring things in the classroom from outside as well. I know they're only in fourth grade right now, but they're starting [to use technology] so much younger than some other people might have the opportunity. The younger that they start, the better they're going be at it. I can only give my expertise, I can explain something all day long, but if you can see it happen, it just really cements it that much more. And if they're able to interact with that technology, it even goes a deeper level.

April finds that technology keeps things new and exciting in her classroom. She said,

When I'm doing different units, then I open up different apps because it's a chance for them to learn something or do something new. Technology streamlines the day and it keeps everything moving. My teaching time is not wasted, as I can move from one thing to another very quickly and it's all laid out for me. Technology becomes a great contributor to whatever you're teaching because there's so much out there that you can find. Sometimes we have access to YouTube and I'll do a story retell and let them hear the story

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told by somebody else via YouTube. Anytime it can make your classroom richer, I think that's a wonderful use of technology and it enhances the education.

Theme Three: Motivation

Motivational factors involving the use of technology were identified by all teachers and spoken about positively. Motivation, as defined for this research, includes the intrinsic and extrinsic needs and drives that engage a person to learn and/or behave in a certain manner. With strong connections of student self-regulation and motivational constructs to the use of technology, findings rest on the ideas of Barber et al. (2011); Csikszentmihayli (1975); Cordova and Lepper (1996); Deci and Ryan (1985, 2000); Gee (2008, 2017); Perttula et al. (2017); Proulx, Romero, and Arnab (2017); Ryan and Deci (2017); Tüzün,Yılmaz-Soylu, Karakuş, et al. (2009); Weiler (2004); and Woo (2013). Ingrid discussed the success she found using technology with struggling or reluctant learners. She commented,

> Especially for a struggling kid, if I can get them to keep their focus and do their work and say, "Okay, you can have 10 minutes on the iPad at the end of the day," and I'll give them something that helps them with a skill they struggle with. It'll be a math game and they'll be super stoked, motivated, and they're very excited about it. Inside and outside of the classroom I think that it's a big pull for the kids. They all want it and they want to get their hands on it.

Ryan liked to use classroom technology as a motivator for her students to complete homework. As she said,

> I think that it (technology) is a powerful motivator. I kind of try to do like their homework. If they're done with their homework, then they can use the Chromebooks. But if they didn't do their homework, then they have to do their homework in class while the rest of the students are using the Chromebooks.

She elaborated on why she felt the technology acted as a motivator within her classroom.

> I think that students like technology because it gives them ownership of what they're doing. It is a lot more personalized to them. It's more differentiated than what I could do while teaching a lesson to the whole class. I feel that the students are a lot more motivated because the lesson is fit to them through technology.

As April discussed her technology-rich Kindergarten reading program she said,

> My teaching is not boring to them because I can teach for ten minutes on a topic and then there's a little clip, a little movie clip that resets them and it just works. Technology can be a motivator academically, especially as they get older in the upper grades and they're more proficient with the available technology. They could produce a product using technology. Even with my first graders, I had them typing journal entries and printing them off and putting them in their journals.

Theme Four: Concerns

All participants discussed concerns regarding the use of technology among

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children and its implications. Concerns encompassed reservations regarding the use of technology by children both inside and out of the educational environment. Ingrid shared that she believed we are all too reliant on technology and added,

> They do enjoy it. They need it, but they also need to learn to live without it. There are some fine arts lost with the dependence on technology [like when] learning how to look something up in a dictionary. Simply editing your written work or looking up how to spell, using paper, pencil resources, using the books that are surrounding us, there are so many available websites, but they still need to learn how to do it manually.

Ryan shared Ingrid's concern when she commented,

> The most negative side effect that I've seen is that we have become too reliant on the technology. When students become too reliant, then it becomes just the student and the computer, and not the social and collaborative aspect of learning in groups or learning as a class.

April echoed the others and expanded to include behavioral changes in children.

> Technology is like most things in life; too much is not good and not enough is not good. There must be a happy medium. Especially outside of school, I see children get on the tablets playing games, and see their whole little personality start to alter and change when they've been on there a long time, especially if it's a very high level

of energy game - a racing game or a fighting game - you see them start to become more agitated if they've been on it too long. I think limiting the access to frivolous uses of technology, and really gearing it towards how it's useful and educational to each student, is more beneficial.

Ingrid also expressed her concern that many children may not have regular access to technology and commented,

> That's the heartbreak of the situation. I could probably get so much more out of them if I could put something in their hands every day. We just don't have enough technology. We don't have enough funding for really what we need. I want to put something in everybody's hands. They may only be second graders, but these second graders are capable of a lot. What would they be able to do by the time they are in fourth grade, if we could put a laptop in their hands everyday beginning in second grade?

Ryan shared her concerns surrounding cyberbullying and internet safety among children.

> I think technology is good as long as it's monitored and controlled. Students are so impressionable, especially the younger ones, and I think all people are a little naive as to the reach of technology. I think people, in general, don't think before they post things. The students, especially at this age, are just beginning to have a little more independence with their technology and they don't understand the consequences of their actions and that

their actions online have offline consequences. Putting your full name out there, putting your school out there, or saying things that you might not necessarily mean it to be hurtful to others; People can take things differently than what you meant. There's a lot of scary things about technology, but there's so much potential as well. I did a cyberbullying presentation, and I told my students, "With great power comes great responsibility. You have a computer in your pocket all the time, but you have to be responsible with it, and you have to make smart choices."

Discussion

This qualitative collective case study examined three elementary teacher participants' perceptions of the effects of technology within their classrooms through the collection of artifacts, classroom observations and semi-structured interviews. Four prominent, associated themes related to the use of technology emerged from the data as follows: behavior, learning, motivation, and concerns. The components of SDT (Deci & Ryan, 1985, 2000; Ryan & Deci, 2017), specifically autonomy, competence, and relatedness were apparent throughout the data and aligned with the themes of behavior, learning, and motivation which emerged through analysis. The findings of this research are consistent with previous research in the areas of self-regulation, learning, and behavior through the use of technology (Barab, Gresalfi, & Ingram-Goble, 2010; Barber et al., 2011; Ciampa, 2014; Cordova & Lepper, 1996; Csikszentmihayli, 1975; Deci & Ryan, 1985, 2000; Gee, 2008, 2017; Proulx, Romero, & Arnab, 2017; Ryan & Deci, 2017; Squire,

2008; Squire, Gaydos & DeVane, 2016; Squire, 2008; Tuzun, Yilmaz-Soylu, & Karakas, 2009; Weiler, 2004; and Woo, 2013). Results revealed that the three participants used technology in similar fashions within their classrooms, which was not surprising since they were all currently teaching in the elementary grades at the same school site. They did, however, differ in the ways they interpreted the perceived effects of technology on their students. Two of the three participants found technology to be an extremely positive asset to their classrooms, whereas one participant was hesitant to adopt specific technologies due to fear of safety and misuse by students. All participants found that the use of technology helped student behavior by providing a positive, motivational tool. Participants also noted that technology acted as a remediation tool for students who needed extra academic assistance through extra practice and educational games. The concerns of participants ranged from internet safety to the overdependence on technology and the loss of traditional paper-and-pencil tasks which may be replaced by technology.

Two identified limitations of this study were (a) all participants were currently teaching at the same school site in the elementary grades, and (b) all participants were female. It is recommended future research initiatives on this topic include multiple school sites, grade levels, and teachers' genders to expand this line of investigation. Additional school sites could potentially add new perspectives from participants, as other sites may employ different curricula which call for the use of different technologies within the classroom. Varying the grade levels of the participants to include teachers' voices from pre-kindergarten, middle, and high school could

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reveal differing perspectives which relate to the age group a teacher serves. Additionally, expanding the participant base to include the gender spectrum might expose patterns in gender-based perspectives about technology.

Directions for future research may include an in-depth exploration of student behavior as it relates to the use of technology, specifically the use of technology on attention-span and impulsivity after exposure to educational technology and electronic games. Also, expanding the research line to include a direct examination of students through observations and interviews would help us understand their actions and thoughts about the use of technology at home and school and would inform the adoption of educational technology. With technology rapidly evolving and found daily in almost every hand, we must continue to take time to understand the implications of its use in classrooms, its impact on the educational process, and its overall effect on children.

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