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THE USE OF TECHNOLOGY IN EDUCATION: 10 CONCERNS THAT SHOULD NOT BE OVERLOOKED

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ABSTRACT

The use of technology in education is being applied worldwide. Several studies present some concerns that should be taken into consideration when technology is applied in classrooms. This article investigates the use of technology in education, specifically 10 concerns that should open the public forum so that the educational community become fully aware of its repercussions. These 10 topics of concern are (1) Digital platforms; (2) Digital books; (3) Investment in education technology; (4) Digital schools; (5) Technology distraction; (6) Technology addiction; (7) Technology and teachers' profession; (8) Effectiveness of education technology; (9) Social and emotional effects; (10) Computerized testing. The review of the literature shows that these concerns should be addressed because they represent serious issues for learners and teachers alike. Further research on these concerns is needed considering the gap between the fast implementation of technology and the possibility to research the consequences of such use in classrooms.

Keywords: Technology in Education, Educational Technology Concerns, Technology Addiction, Technology Distraction, Education and Technology

1. INTRODUCTION

The use of technology in education has experienced an increasing interest in the last few decades. Nowadays, in the second decade of the 21st century, we see how schools promote the use of technology in the classroom. From K-12 schools to undergraduate and higher education schools, technology became an expected tool to help in the teaching-learning process.

However, there is a public debate regarding the use of technology in education and its implications for students, teachers, parents, and administrators: is technology helping students learn? Does technology facilitate the teaching process?

Do parents agree with a technology-based educational system? What is the role of administrators in this process?

Proponents affirm that educational technology promotes learners' engagement, group collaboration, and immediate access to information. On the other hand, teachers can use interactive platforms, online surveys, and content educational videos. Critics point out that technology foments learners' distraction, lower academic performance, and privacy and security concerns.

In this study we are investigating several issues related to technology that concern the school community: technology platforms; books and computers; computerized state testing; smart and traditional boards; investment on technology and teachers and teachers' profession. Also, we stress the repercussions of technology to students, teachers, parents, and administrators mentioning relevant literature associated with these issues.

2. TECHNOLOGY ISSUES IN AN EDUCATIONAL SETTING

2.1. DIGITAL PLATFORMS

All over the world we are experiencing a quick digitization of educational tools and services provided to both teachers and students. The way teachers take attendance, present their lessons, grade students, set up assignments, and learners do their activities, research, or study, is changing in the last decades towards more prevalent digital methods.

Classroom management programs such as ClassDojo and Google Classroom; game-based learning platforms such as Kahoot, Blooket, or Quizlet; presentational platforms such as PowerPoint, Pear Deck or Nearpod are common in classrooms.

From a teaching-learning perspective we must ask if these platforms really help students and teachers be more effective and provide a better educational experience.

Manolev et al. (2018) argues that Classdojo incentives students' surveillance and promotes a culture of behavior control. Other scholars Williamson (2017) point out positive features of this platform: "It is a persuasive technology that enables schools and teachers to promote and reward behaviors that indicate students' social-emotional learning, growth mindset, and character development" (p. 451). Regarding Google Classroom, Azhar & Iqbal (2018) conducted a study in which teachers of higher education were surveyed on the effectiveness of this digital platform. Most teachers responded that the platform was inefficient due to not being an user-friendly interface. Other scholars however state the benefits of the use of this platform in secondary education Ramadhani et al. (2019) and in higher education Kumar & Bervell (2019). Abdul Jabbar & Felicia (2015) conducted a systematic review on game-based learning platforms. These scholars did not find any evidence of effectiveness of game-based learning platforms. However, they found that engagement in a game-based learning depends not on the platform itself, but on the students' cognitive and emotional involvement in the gameplay. All et al. (2016) added that beyond the students' characteristics, the environment where the game-based learning is implemented plays an important role on the effectiveness of these platforms. Thus, if implemented in a school context, "tech savviness of the teacher and his/her attitude toward digital games as an instructional tool could also influence results" (p. 101). Regarding the use of presentation platforms in school settings, Baker et al. (2018) conducted a meta-analysis of 48 studies to determine if students learn more when taught the same material using PowerPoint compared to traditional instruction. Results showed that the learning process did not depend on

the presence of the platform but on how instructors can use different resources that help students learn. Anggoro (2020) points out some weaknesses in PearDeck such as the availability of certain features for free users and the need of a Google account to experience the application. Other scholars Ilknur & Yaniv (2022) stress the potential benefits of interactive and collaborative features. However, they point out that this interactivity is limited because it is between students and content, not among students. Burton (2019) believes that Nearpod increases students' engagement since it allows them to ask questions anonymously. This presentational tool provides similar features as other online platforms such as live polls, updates of participation from students and a number of video and online resources.

2.2. DIGITAL BOOKS

Many school districts have started the transition from paper-based textbooks to digital learning. However, different studies show that students show preference for traditional methods of instruction and classroom materials. Berges-Puyó (2018) conducted a study in which 172 secondary learners of a second language stated that they valued textbooks as much as computers as didactical materials for their learning process. Baglione & Sullivan (2016), in a study of students' perceptions on classroom materials, found that students perceived printed textbooks easier to read, understand, and navigate than digital books. McNeish et al. (2012) surveyed 386 undergraduate students on their preferences of learning materials and results showed students' resistance to giving up the paper textbook adducing that paper textbooks facilitate their learning and study processes. In another study, Weisberg (2011) investigated learning outcomes in higher education regarding the use of digital books in comparison to traditional paper textbooks. Weisberg found no significant difference in learning between the students learning with paper textbooks and students learning with digital books. The same conclusion was obtained by Woody et al. (2010). In some cases, this transition from paper books to digital books is taking a step farther since some schools are implementing a teaching-learning model in which neither paper textbooks nor digital books are available for students. In this case, teachers are encouraged to find their own teaching materials online. At the same time, these schools keep investing in 1:1 computer program. Further research is needed to evaluate the repercussions of not using a textbook and the implications on students' and teachers' teaching and learning process.

3. INVESTMENT IN EDUCATION TECHNOLOGY

Educational technology refers to both hardware and software aimed to help with educational goals Dron (2022). Today, hardware includes Chromebooks, laptop computers, iPads and other tablets, smartboards, and smartphones. Educational software describes computer applications designed to help with the teaching-learning process. These applications are often Internet or cloud-based. They are constantly updated and new applications are available every day. We mentioned them earlier under the section "digital platforms". During the last 30 years, large investments of money have been made towards educational technology. In the United States, the total overall funding for K-12 programs was $124.3 billion for the fiscal year 2022. According to a recent report by Market.us, a market and consulting research company, the global K-12 education technology spend market is going to grow from $14.8 billion in 2022 to an expected $132.4 billion in 2032. This huge amount of money invested in technology, not only applies to hardware and software aspects but also, to services related to the use of these devices:

cybersecurity, network infrastructures, content filtering, etc. Moreover, teachers need training to use these devices and being able to help students manage theirs; technicians must be available when these devices need updates and repairs or when the system is down. In this context, many scholars wonder if this huge investment in technology is reasonable considering not only the money, but also the time, the training, and human resources needed for its implementation, especially when there are voices that put into question the effectiveness of educational technology Cheung et al. (2013), Christmann & Badgett (2003), Delgado et al. (2015).

3.1. DIGITAL SCHOOLS

Considering the growing investment in educational technology, someone could think that technology would be present in all schools. According to a survey by the U. S. Department of Education National Center for Education Statistics, 94% of public schools surveyed reported they are providing digital devices to students who need them for the 2022-2023 school year. In higher education, the majority of college students bring and use their laptop in the classroom Elliot-Dorans (2018), Patterson & Patterson (2017). On the other hand, there are schools that put limits on educational technology. For instance, K-12 Waldorf Schools don't use computers for instruction and recommend students a screen-free model at home, especially in the early childhood and elementary years. In higher education, the Wyoming Catholic College establishes limits on technology such as no televisions on campus, dorm internet access limited to school email and selected websites for class, and no cell phones or devices with wireless or cellular data. The schools that offer a technology-free or a limited technology approach, base their vision on the concerns we tackle in this article.

3.2. TECHNOLOGY DISTRACTION

There are many studies that show how the use of technology in the classroom creates a negative effect on learners' attention. Flanigan & Babchuk (2010) state that digital distraction hinders students' learning. Sana et al. (2013) found that learners who multitasked on a laptop during a lecture achieved lower tests' grades than those who did not multitask. Also, participants in direct view of their multitasking classmates obtained lower grades than those who were not in direct view of the multitasking students. McCoy (2016) conducted a study in which 675 college students from 26 different states in the US answered a survey regarding the use of digital devices in the classroom. Results showed that the average respondent used a digital device 11.43 times for non-academic purposes during a typical school day in 2015. In the same direction, Goundar (2014) conducted research in New Zealand investigating the influence of the use of technology in the classroom and he found that students reported being highly distracted by the use of electronic devices for non-academic use during lectures. Lastly, Hall et al. (2020) also found that students' laptop use distracts neighboring students. These distractions take away learners' attention which has repercussions on academic performance. In other words, these digital distractions are hindering the learning process Halubanza and Kadakwiza (2023), Sampasa-Kanyinga et al. (2022), Elliot-Dorans (2018). Considering the negative effects that this digital distraction presents, some scholars have suggested some solutions: Cheong et al. (2013) suggest the implementation of a no-devices policy and sharing the rationale for this policy; Flanigan & Babchuk (2010) point out that creating appealing, original and inspiring lesson plans can incentivize learners' engagement and participation; Seemiller (2017) stresses the importance of sharing

with students research Duncan et al. (2012), Froese et al. (2012), Kuznekoff & Titsworth (2013) that confirms that the use of electronic devices in the classroom may make it more difficult to earn a higher grade.

3.3. TECHNOLOGY ADDICTION

Society is becoming more dependent on the use of technology. To carry out different tasks, most people rely on some form of technology. Electronic devices are overwhelmingly present in our society. With a different degree of frequency, most individuals use some kind of technological device every day: cell phones, tablets, laptops, smartwatches, smart televisions, gaming consoles, etc. The common denominator of these devices is that most require the Internet or are compatible with their connection to the Internet. Technology can be useful and empowering but at the same time, it can be the cause of important issues. Some scholars Kuss et al. (2013), Lozano-Blasco et al. (2022) stress the incidence of Internet addiction among teenagers. Hou et al. (2019) investigated the negative effects of social media addiction on college students' mental health and academic performance. Gerhart (2017) warns on the dependency of the use of technology and how people don't see this use as negative, despite their constant craving for it.

All these negative effects of the use of technology must be brought forward when discussing its use in our schools. Schools are allowing, promoting, and incentivizing the use of technology. However, the above-mentioned risks are present: the use can become overuse, and then result in addiction.

4. TECHNOLOGY AND TEACHERS' PROFESSION

Another important issue that deserves to be mentioned is the number of resources that are allocated to technology and its impact on the teacher's profession. The investment in technology is not only a financial investment, but also an investment on time (technology workshops for teachers and students) and human resources (hiring of technicians and technology specialists). As we mentioned earlier, school districts are investing huge amounts of resources into technology while many schools need more teachers and more resources for academic-related professional development, so that teachers can better serve their students. In the US, there is an important problem with teacher shortages Sutcher et al. (2019), Wiggan et al. (2021) and attrition Madigan & Kim (2021), Li & Yao (2022). Some scholars Darling-Hammond (2003), Corbis and Marinsky (2004), Grier and Holcombe (2008) advocate that in order to attract and keep more teachers, schools need to make these positions more appealing by reducing teacher-student ratio, hiring more teachers, increasing salaries, providing more professional development opportunities tailored to the specific school where teachers are and improving safety and disciplinary policies. All of these actions would require an economic investment that in many cases is not possible due to the large budget assigned to technology. On the other hand, this increased investment in technology in schools has caused negative consequences on teacher attrition, becoming one of the reasons why some teachers decide to quit or change professions since they claim the use of technology made them feel stressed and overwhelmed Fernández-Batanero et al. (2021), Goebel & Carlotto (2019), Tucker (2018).

5. EFFECTIVENESS OF EDUCATIONAL TECHNOLOGY

It is important to find out if the use of technology in the classroom creates a higher academic performance in learners. In other words, is learning with technology helping students achieve better grades and learning in a more efficient manner? Rashid & Asghar (2016) did not find a significant direct effect between technology use and academic performance. Muir-Herzig (2004) investigated the effects of technology use in the classroom regarding at-risk students' grades and attendance. Results showed that the use of technology by teachers and students had no significant positive effect on the grades and attendance of at-risk students. Bergdahl et al. (2020) studied the implications of the use of technology in the classroom in an upper-secondary school setting, considering three types of students: low performance students, average performance students, and high-performance students. Results showed that only high-performance students were able to use the technology to their academic advantage, while average and low performance students were not able to use technology in supportive and productive ways. On the contrary, Bergdahl et al. (2020) found significant correlations between low and average students and unauthorized multitasking via learning technologies while in class. They also found a correlation between low grades and time spent on social media and other non-academic websites while in the classroom. In relation to this, Ben-Jacob & Glazerman (2021) warn us of the ethical implications of the overuse of technology which undermines trust and fosters an adverse impact on education.

6. SOCIAL AND EMOTIONAL EFFECTS OF THE USE OF TECHNOLOGY IN EDUCATION

Vaghefi and Lapointe (2014) point out the negative impact of smartphones on relationships with families. Furthermore, given the earlier-mentioned effects of technology on learners' attention and addiction, it is not a surprise because parents seem to be reticent to let their kids use their smartphones in schools Hadad et al. (2020). Technology is a source of distraction Flanigan & Babchuk (2010), Sana et al. (2013) academically and socially. While in the classroom, the use of technology might be a distraction Bergdahl et al. (2020) while outside of the classroom, the attention to screen takes a time that can be spent on direct communication with other human beings. Thus, the use of technology in a school setting has academic effects but also social and emotional consequences. Dwyer et al. (2018) found that the use of smartphones in a social setting undermines the benefits derived from social interactions. Similarly, Kushlev et al. (2017) found that the use of technology to get information may lead to losing opportunities to develop social connections. Emotionally, Limone & Toto (2021) studied the psychological and emotional effects of digital technology on children during the Covid-19 pandemic. They found that during the pandemic, there has been an increase in the use of technology, especially smartphones. These scholars concluded that this increased usage might produce effects on the brain, including but not limited to, depression, anxiety, Alzheimer's disease, and sleep and cognitive disorders.

7. COMPUTERIZED TESTING

Llabre et al. (1987) found that computer-administered testing can potentially increase test anxiety for learners unfamiliar with computers. Shermis (1998) in a

study with college students, found that test takers experienced a statistically significant computer anxiety when they took a reading computer-based test. However, results showed that the same students did not experience computer anxiety in two other computer-administered placement tests: math and written English.

There is a lack of research on the effects of computerized testing in elementary schools. Considering the above-mentioned effects of technology in education, it is necessary to call for more studies investigating this use of technology by our younger learners.

8. CONCLUSIONS

The use of technology in classrooms started in the early 80's. Since then, technology use in classrooms has experienced a gradual and constant increase. Now, in the second decade of the 21st century, we see how schools are normalizing this use at all levels and ages, many times without research on the consequences of such use. This paper aims to call for the attention of the educational community to become aware of some concerns that should be taken into consideration before implementing education policies based on the use of technology. Ten are the conclusions that we present:

1) The use of digital platforms for different purposes (classroom management; game-based learning; and presentations) don't show to be effective, help students learn more, promote collaboration among learners, be more engaging, or provide a better educational experience. On the contrary, they present risks of behavior control Manolev et al. (2018), lack of effectiveness on learning Jabbar and Felicia (2015) and an absence of engagement sustained over a period of time All et al. (2016).
2) Digital books are not preferred by learners over traditional paper textbooks. Furthermore, learners consider traditional textbooks easier to read and understand Baglione & Sullivan (2016). Also, learners see traditional books as an important tool that helps them learn and understand subject contents better McNeish et al. (2012). Besides, the use of digital books over the traditional books, do not produce an increase of learning in students Weisberg (2011), Woody et al. (2010).
3) The huge amount of money invested in education technology does not produce a positive return. Billions of dollars are invested in education technology while learners' academic performance, schools' safety, stress and anxiety, discipline, and teachers' retention are at historical low levels. Schools need more teachers, less discipline issues, and a more efficient culture where students and teachers feel safe, happy, and fulfilled. To do that, schools need to invest in professional development programs to help teachers serve learners better, adopting character and values educational programs Berges-Puyó (2020) that provide excellent results in schools around the world, focusing on educational programs that promote unity and success for all Berges-Puyó (2023).
4) Despite the majority of schools using and promoting the use of technology there are Schools (Waldorf schools; Wyoming Catholic College) that limit or prohibit the use of technology considering the harm that it produces (anxiety, distraction, social and emotional issues, etc). Analog schools represent a model of education based on traditional teaching methods.

5) The use of technology creates a negative effect on learners' attention Flanigan & Babchuk (2010), Sana et al. (2013), McCoy (2016), Goundar (2014), Hall et al. (2020) hindering the learning process Halubanza and Kadakwiza (2023), Sampasa-Kanyinga et al. (2022) and making it more difficult to earn a higher grade Duncan et al. (2012), Froese et al. (2012), Kuznekoff & Titsworth (2013).

6) The use of electronic devices in schools can lead to Internet addiction Kuss et al. (2013), Lozano-Blasco et al. (2022) social media addiction Hou et al. (2019) and technology dependency Gerhart (2017). Electronic devices are compatible with their connection to the Internet which allows learners to browse non-academic sites. This creates distractions, fomenting the need to check social media pages, chats, or other unauthorized websites.

7) The use of technology has a direct negative impact on teachers' profession since some teachers decide to quit or change profession each year due to the stress related to what they consider an overwhelming use of technology Fernández-Batanero et al. (2021), Goebel & Carlotto (2019), Tucker (2018). As some researchers suggest Darling-Hammond, (2003), Corbis & Marinsky (2004), Grier and Holcombe (2008) in order to retain and attract teachers, schools need to make these positions more appealing, not only in terms of reducing teacher-student ratio, raising salaries, or improving safety but also, fomenting a school culture where teachers can reduce their anxiety and stress levels originated by the constant push for the use of technology. Finding a balance between technology and traditional teaching would be a good starting point.

8) The use of technology does not promote a higher academic performance Rashid & Asghar (2016). On the contrary, Bergdahl et al. (2020) found that the use of technology in the classroom creates a distraction on low and average performance students that show a tendency to unauthorized multitasking. This has ethical repercussions in the school culture undermining trust Ben-Jacob & Glazerman (2021).

9) In the classroom, the use of technology poses a risk of distraction. Outside of the classroom technology can be a deterrent for social relations and interactions because instead of interacting with faces, the interaction is with screens Dwyer et al. (2018), Kushlev et al. (2017). Emotionally, the use of technology can derive in conditions such as depression, anxiety, sleep and cognitive disorder, and Alzheimer's disease Limone & Toto (2021).

10) Computerized testing can potentially cause test anxiety Llabre et al. (1987), Shermis (1998). Providing paper testing could reduce the levels of anxiety and stress. There is a need for further research on this topic, especially regarding elementary students that are often subject to computerized testing.

We live in challenging times. Challenges are also times for opportunities. Opportunities to be better educators by serving better, and becoming more open to other options, opinions, suggestions, or ideas. We also live in an era of technology. However, considering the review of the literature presented in this paper, it seems that we have arrived at a point where we need to re-evaluate the needs in our schools, classrooms, and educational communities regarding technology. Is this the path that we need to walk? Is this the path that is going to take us to our best destination? Is this the way we want to educate our children? Are we going to tackle these technology concerns that entail important consequences? We encourage the educational community to investigate all

these issues further, so that among all, we can offer better schools, better education, and a better life to our future generations of professionals, of human beings. This article aims to help in that direction.

CONFLICT OF INTERESTS

None.

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