The Struggle to Find Educational Technology's Place in the Classroom

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Christian Kinzer
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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

Signature _____ Date 5/5/2020
Christian Kinzer

Approved _____ Date _____
Dr. Richard Jacques, Associate Professor of STS, Department of Engineering and Society

Introduction

In the course of human history, technology has held a key role in education. Inventions such as the printing press, writing utensils, and calculators have had understandable and profound impacts on general societal education. Advancement in societal education is valuable as it can bring economic success and provide a better quality of life for the masses. Thus, as we continue to advance technologically, we should consider how current technology can be used in the classroom to provide the highest quality of education.

As is the case with the widespread adoption of any technology, it is vital for users to be aware of any potential danger. As computer science continues to push the economy, many companies compete to provide educational technology tools to educators. These companies can be financially incentivized to collect data on students as their products are used. This raises multiple questions of ethics that overlap both the computer science and education industries.

Another danger of computer integrated educational technology is data security. It is very difficult to create a totally secure digital platform, especially if that platform is connected to the internet. With malicious actors in play, it is vital to have as secure of a system as feasible. Sometimes security is compromised and users are potentially harmed. The notion of security is native to almost everything in computer science, and we should be sure to extend the right line of thinking to consider this problem in the context of education.

Throughout this paper, I aim to provide a framework for thinking about the role of technology in modern education. I begin first by defining an ideal goal for educational technology by examining the purpose of education in society. Then, I show examples of risk by examining historical failures of educational technology and their impacts. I continue by highlighting the current ethical standards in the industry of educational technology and their limitations. I then attempt to provide perspectives on the ethics of educational technology from educational technology companies, educators, and parents and

students. I then conclude, hoping to have provided a complete picture of technology's role in modern education.

Purpose of Education

In an effort to judge what makes educational technology effective, we must consider the overall objective of education. Then, if a piece of educational technology advances humans toward such an objective, we can say there are educational benefits to the technology. These educational benefits must also be weighed against potential economic and societal effects of mass adoption.

Historically, there are many goals of societal education. One claim is that education is meant to "give the young the things they need in order to develop in an orderly, sequential way into members of society" (Dewey, 1934). Others have claimed that education is meant to provide an individual with intelligence and character (King, Jr., 1948). Some suggest that the purpose of education has changed from producing a literate society to producing a learning society (Ammons, 1964). Foshay argues that "the one continuing purpose of education, since ancient times, has been to bring people to as full a realization as possible of what it is to be a human being," though he cedes that other accepted purposes of education such as contributing to the economy, preparing students for a job or career, and promoting social/political systems can directly conflict with his perceived purpose of education (Foshay, 1991).

While it appears that academics and researchers have similar ideas for the purpose of education, specifically revolving around preparing students for life in a particular society, the general public is more divided on the topic. According to an annual poll of the public's attitude toward public schooling in America, 45% of respondents said the main goal of a public education is to prepare students academically, 26% said it is to prepare students to be good citizens, and 25% said it is to prepare students for work, with 4% of respondents saying they weren't sure of the purpose of a public education (PDK, 2016). Extensive research has been done on students' attitudes toward education, and it is evident that students don't carry the same beliefs as academics regarding the purpose of education. In a survey of

Australian students aged 11-18, researchers found that students have little faith in the educational system and question its goals (McMahon, et al., 2015).

There are possible explanations for the disparity in educational ideals between academics and students. It is safe to assume that academics inherently value education and learning, whereas students are not necessitated to feel the same. Maybe since academics hold education in such high regard, they are more inclined to have positive feelings about the general purpose of education. Another possible explanation is that in their commentary, academics write about the absolute ideal education systems, whereas students react to their personal experiences with education systems. This would suggest a disparity in the actual and perceived goals of education, as the actual goals are more like the academic writing and the perceived goals are closer to those of the students.

For the sake of continuing this paper with one idea of a goal for education, we will assume that such a disparity does exist, and that a quality of good educational technology is that it helps to bridge this disparity. Viewing educational technology in this light allows us to consider both idealistic thinking about readying students to participate in society and practical thinking about how students perceive and appreciate the tools being used.

Historical Danger in Educational Technology

As stated in the introduction to this paper, technology has been used in education for nearly all of human history. Historically, with regard to older technologies such as pencils and erasers, there has been little concern about the potential dangers of using. As we have moved into the digital age, a litany of new risks have appeared regarding computer safety. Advancements in the fields of data science and machine learning have allowed programmers to create extremely personalized and interactive content. This brand of content extends naturally into educational technology, as we can now create personalized and interactive learning. These data techniques come with many risks and ethical questions, as we can see from historic examples of danger in educational technology.

In recent years, many universities have been targeted in various forms of cyberattacks. In 2015, the University of Virginia's IT Department was illegally hacked, resulting in a system security upgrade delivered across the entire university (Seal, 2015). No personally identifiable data or sensitive research material was accessed, though in another cyberattack from 2005-2007, hackers accessed the social security numbers of 5,735 faculty of University of Virginia (Wood, 2007). In 2019, Lancaster University fell victim to a phishing attack that resulted in the loss of names, phone numbers, and email addresses for undergraduate applicants and personal ID records for a small group of students (Lancaster, 2019). In 2019, a malware attack on the University of Giessen resulted in 38,000 students and faculty receiving new passwords in a line (Hassenschau, 2019).

These examples of cyberattacks highlight many dangers relating to protecting student data. Primarily, it is obvious that hacking student and faculty records is valuable to the attackers. Any decently large aggregation of student data is susceptible to cyberattacks simply because the data has real value. This means that educational institutions must act preemptively to protect student records. However, these attacks still happen and will continue to happen as practical computer systems are rarely totally secure. These attacks pose serious threats not only to the records of personal information, but also to the educational institution. Server downtime has a real economic cost in these situations, and often these cyberattacks are followed by expensive upgrades to information technology departments.

Another risk to students' privacy is posed by educational data mining. Some researchers anticipate that the concept will push the future of education through the creation of personalized learning (Koedinger, et al., 2015). InBloom was a company backed by venture capitalists that aimed to collect personally identifiable information on students to create a centralized and personalized learning environment. A coalition of parents sued inBloom for collecting data on their children without their consent. The parents won the decision and inBloom folded (Bulger, et al., 2017). This highlights how

educational technology companies can sometimes pursue financial incentives that conflict directly with the goal of education as outlined above.

Lack of Definitive Standards

A large factor in the struggle of evaluating educational technology is the lack of definitive standards surrounding the practices of these companies. Fortunately, there are many groups dedicated to defending students' rights and promoting positive educational technology. Educational technologists and academics have written extensively about ethical questions in the industry; however, no definitive standards yet govern educational technology companies' data use and protection practices.

Lin (2007) found that professional educational technologists were most concerned about matters of copyright, data ownership, user privacy, and accessibility, and noted new ethical issues in diversity, conflicts of interest, and professionalism. This would suggest that educational technologists are aware of the potential dangers surrounding data collection. Arpaci, et al. (2015) wrote that better security positively promotes the use of educational technology, recommending that universities provide free, secure cloud services and training. It is vital that academics can make recommendations to universities regarding data security. Ifenthaler and Tracey (2016) contend that universities must disclose who has access to what data and what algorithms are used. Such action would help to enforce universities to maintain ethical treatment of personal student data.

The U.S. Department of Education's Office of Educational Technology develops national educational technology policy (OET, 2019). The DoE's Student Privacy Policy Office enforces federal laws that protect the privacy of education records (SPPO, 2019). While the presence of these offices is essential, lawmaking is a slow process and many of the current ethical issues surrounding educational technology are not mentioned in the legislature.

Another issue arises when considering users' attitudes to their own data privacy. The IUIPC outlined many consumer concerns with data privacy, resulting in a model to predict how consumers could

react to potential data infringements (Agarwal, et al., 2004). This has led to information about data privacy being hidden deep into terms of service and privacy policies. Unfortunately, researchers have found that terms of service are written at extremely high reading levels, making them virtually unreadable (Benoliel and Becher, 2019). In addition, other researchers discovered that 74% of people completely skip reading terms and conditions (Obar, 2016). It is clear that there is a disconnect between the user and the licenser in most cases, and educational technology companies could abuse this disconnect to collect data on students.

Educational Technology Companies

Educational technology companies face many pressures from educators, students and parents, and financiers when creating and maintaining products. Educators often want what they perceive to be the best product for learning, parents and students are more concerned with data privacy, and financiers expect returns.

The Association for Educational Communications and Technology is a trade association for educational technologists that promotes the use of technology in the classroom. Members are held to professional standards of "high quality artifacts, ethical conduct, and social consciousness" (AECT, 2019). The AECT aims to support a network of educational technologists and act as a voice for workers in the industry. While the AECT does a lot of work to promote the benefits of emerging educational technologies, they do not comment on controversies in educational technology. Criticisms of examples of poor educational technology could further incentivize individuals and companies to meet AECT standards.

Blackboard (2019) claims its educational technology offers teachers a uniquely connected experience and serves as leverage to "partner with the global education community to enable student and institutional success". This reads clearly as Blackboard attempting to cater to the wants of educators. These companies are aware that the customer is not the end user in this case, given that they are marketed

toward educators as opposed to students. If these platforms are not designed for students, are they really furthering the purpose of education as outlined above?

Educational technology companies hardly ever interact with students or parents to discuss their products. Educators serve as a go-between for these parties, as encouraged to do so by the NEA (Donahue, 2019). This can be seen as a layer of obstruction between a student or parent concerned about technology in the classroom.

Educational technology companies are often backed by financiers such as venture capitalists. As researchers have outlined the way venture capitalists view the market, we can see that venture capitalists really only look to maximize profits (Bygrave and Timmons, 1992). Research in the Journal of Education Policy highlights how the pressure from venture capitalists forces educational technology companies to maximize profits in ways that are detrimental to the goal of education (Garrison, et al., 2016).

Educators

As mentioned above, educators play a key role in educational technology as they are the customer and the go-between for the technology and the students. As shown in a survey conducted by the DoE and the Institute of Education Sciences, technology is readily available for educators to use, as most schools are outfitted with the requisite materials (Gray, et al., 2010). Teachers are heavily incentivized to use classroom tracking software as well as online educational material. It is vital for them to understand how to safely implement educational technology in their classroom.

The Office of Educational Technology has online resources for teachers with a litany of information regarding how to use emerging educational technologies (OET, 2019). While these resources improve the general technological literacy of readers, there is very little information regarding privacy or safety when adding technology to the classroom. If teachers had more resources for understanding online safety as it is relevant to educational technology, less users would be at risk.

The switch to technology heavy learning environments has changed the role of the modern teacher. Researchers have discussed the relationship between educational technologists and teachers, specifically with regard to the assumptions they make about teaching. They devised a reform agenda consisting of preparation of models for working with educational technology, design of intelligent software, creation of technological tools for professional development, and improvement of research about technology in education (Kerr, 1989). This research in particular highlights the disconnect between educational technology companies and educators, and provides a better framework of how educational technology could work in the future.

Parents and Students

Parents and students are often very unaware of the risk they undertake when engaging with educational technology. As stated above, many users do not read terms and conditions supplied by companies. Younger students are particularly vulnerable to using malicious educational technology, as they may not understand the bigger picture regarding data safety. Fortunately, students are taught basic computer skills including internet safety in school. While this computer education is necessary and largely beneficial, students are still vulnerable to educational technology companies with questionable morals.

The Parent Coalition for Student Privacy (2019) represents parents who oppose the sale of their children's data to third parties without notification. The PCSP asserts that "no advertising should be allowed on instructional software or websites [...] since ads [...] serve no legitimate educational purpose." The Coalition is dedicated to representing students and parents that question the quality of educational technologies. Data mining can be used to generate personalized advertisements and educational technology companies are financially incentivized to provide advertising space, especially if they do not have sufficient funding.

Trainor (2015) explored student privacy in the modern age, highlighting three concepts considered essential moving forward: student data should only be used for educational purposes, parents

and students should have access to their educational records, and that schools should be as transparent as possible regarding how student data is collected and used. This research, amongst other papers, explains that students and parents should have more rights surrounding educational technology.

Conclusion

As I have outlined it, the dynamic between educational technology companies, educators, investors, and parents and students is quite complex, and some needs are unmet. Conflicting agendas quickly appear and it becomes evident that something must be done to control the quality of educational technology. We can observe the dissonance between idealistic learning as the purpose of education and the unfortunate realities of an educational industry. With that being said, more research is being done on the topic of educational technology, and in the coming years we can hopefully enforce structural changes to improve the general implementation of educational technology.

I would hope to see future legislation regarding the data privacy of students. I believe that transparent policies as outlined by Ifenthaler and Tracey (2016) are beneficial to both individual students and educational institutions, and could help to make students feel more comfortable about their privacy. I also do not think that the current state of electronic terms and conditions is ethically fair to users, and I hope to see stricter regulations on ensuring user risk awareness. A clearer dialogue between educators and educational technology companies should be started, so that we can shift the focus of the software purely to improving learning.

In this paper I have provided a summary of ethical issues surrounding educational technology, as well as a definition of a purpose of education, to be used to judge the efficacy of educational technology. Trying to view the entire industry from various perspectives can highlight problems with the current system, explain motives behind those problems, and begin the process of solving those problems. I wish to conclude this paper with hope that awareness of these issues continues to spread so that they can be solved in ways that help to further the overall goal of education.

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