Signature Assignment: Literature Review on Technology in the Classroom

MOLLY HAKE

Division of Education, Azusa Pacific University

EDUC 538 Current Issues in Education

October 6, 2024

Signature Assignment: Literature Review on Technology in the Classroom

Introduction

The topic of technology in education is perhaps one of the most prevalent today. Though in some ways it is a rather new topic compared to others, countless studies have been conducted to find how technology is being used and how it affects all stakeholders in the world of education to determine how it should be used. Technology has invaded nearly every aspect of life and culture in America and in most of the world. To neglect delving into research on how it affects education would be a grievous oversight. Already districts and schools are requiring multiple forms of technology to be used in nearly every classroom. Technology is not something that can be avoided or ignored. It instead must be addressed, studied, tested, and then used, manipulated, enhanced, or limited according to the results and findings concluded from said necessary studies.

Technology, however, is a very broad term and so it is unlikely for a study to look at all of its forms and uses and affects. Instead, technology use in the classroom can be categorized by its uses and its effects. Each of these categories of uses, or effects are addressed in the following sections that share findings from several recent studies on the topic of technology in education.

General Technology Use in the Classroom

First, we should address the general uses of technology in the classroom. Any stakeholder in education in the US is likely familiar with many of the multitude of ways technology is being used, yet it is wise to look at specific research studies done on how technology is being used long-term, how it is being used to “gamify” learning, and how it is being used as a tool of communication in education.

Bryant, Child, Dorn, and Hall, (2020) conducted a study using data from the 2018 PISA to determine the long-term effects of different technologies in different circumstances on student

outcomes. The study found that the following factors matter when considering technology's effects: the type of device, geography, who is using the technology, and the school's current level of performance. For instance, while projectors and computers have helped student outcomes, laptops and tablets have harmed them. Also, while laptop use was a harm in almost every region, it actually was beneficial overall in the US. It found that generally, technology in the hands of teachers is a help and technology used by students alone is a harm. Lastly, it saw that countries with schools at the lower level generally perform worse, not better, with technology.

The information this study gave was certainly comprehensive and broad. It gives us a foundation of the aspects of technology use and the various factors one should consider when looking to integrate technology in the classroom. Their point about technology being a help in the hands of teachers and a harm in the hands of students was perhaps their most profound. I believe it is a point that makes perfect sense and should be in the minds of every teacher. Teachers must be the brains behind the use of technology and can't blindly trust students.

A study done by David and Weinstien (2024) first took 30 and then 120 students from a Greek school and tested various methods of gamified experimental technology and motivation methods on them. The study found that using motivational framing strategies with the use of interactive technology enhanced students' sense of choice, competence, relatedness to others in the classroom, and interest and engagement in the academic sense. Thus, it found that how the technology was being used did matter for how effective it was in increasing student motivation, interest, and engagement in the academics of their lessons.

Their conclusions are not surprising when paired with other studies as it, like most others, says that how technology is used greatly influences how it impacts students. It would be great to

see a similar study take place with a broader sample of students from the US that also takes into consideration the socioeconomic status of students and their previous technological experiences.

Woodhouse, Passey, and Anderson (2024), conducted a comparison of case studies from nursery and primary schools in Northern Ireland and New Zealand to investigate how digital technology has been used to cultivate home-school connections. The study concluded that technology can and should be used to establish, develop, and maintain connections and open lines of communication among school staff, teachers, families, and students, but the way in which programs are used and the goals of the use are far more important that which program is used. The study also concluded that teachers and schools should seek feedback on the technology being used to communicate to see if the technology is effective and successful in its goals.

Again we find another study that concludes that the purpose and use of the technology matters far more than the technology itself. This study made a particularly interesting note when it suggested looking for feedback on how technology is working for the specific group. This only makes sense, yet it is often overlooked in favor of broad data, though this is a topic that can depend greatly on very unique factors in every population or school system.

As can be seen from all of these studies, the general use of technology in classrooms and the world of education is varied and broad. The rest of this review only further shows that. However, it is the purpose and method of its use that matters far more than what technology is being used. In other words, the people involved matter more than the technology.

Effect on Student Academic Achievement

Perhaps one of the biggest questions surrounding the topic of technology in education is what effect it has on students' academic success, and generally speaking, it can have a positive effect in this area, but its effects can also depend on other factors.

A study published by Park and Weng (2020) sought to investigate how information and communication technologies (ICT), as well as other factors, influence student academic achievement. This study looked at data gathered from the PISA 2015 data on 9th-grade students from 39 countries. It concluded that students' interest in ICT, perceived ICT competence, and autonomy had positive impacts on academic performance and that the GDP per capita had significant effects on the relationship among ICT-related factors and academic performance.

An important part to note of this study's conclusions is that a country's level of wealth influences how technology influences academic success. Of course we know that less money generally means lower academics, but beyond that, it influences how technology impacts academics. This knowledge fits well into the previously discussed concept that technology itself cannot be determined as beneficial or harmful unless other factors are considered as well.

Wang, Hsieh, and Kung (2023) conducted a study to look into the effects of smartphone use on the academic performance of elementary students, particularly in the context of the Covid-19 pandemic. The study used a questionnaire given to 499 Taiwanese 5th and 6th grade students who had used their smartphones consistently over the previous year. The study concluded that high smartphone use was associated with higher academic performance.

This study only scratches the surface of an emerging conversation. Seeing the disparity between those who have the opportunities of smartphones and those who do not reveals the need for teachers to be aware of those differences and the impacts they discovered, especially as heightened in the context of virtual classrooms and distance learning.

Thus, in a way connected to how the use of technology influences its effects, so also do factors like economic status, access, student comfort, etc., impact technology's effect on academic achievement. All factors should be considered when making technology decisions.

Effect on Student Social Emotional Wellbeing

Students' social and emotional wellbeing has become one of the top concerns in the world of education, largely as a result of the increasing numbers of mental illness, suicide, and trama. It is necessary, thus, for us to look at the effects of technology in this area. Even students' physical wellbeing is being affected by technology, so it is an area that cannot go unresearched.

There is a literature review by Alumaind (2019) that sought to investigate the potential negative effects of technology use in the classroom on education in students' academic success and social and physical wellbeing. It concluded that students' competencies in reading, writing, and arithmetic are deteriorating with further technology, that typing and typed information hinders reading and writing growth, and makes kids' brains shallower. The study said that technology has had a dehumanizing effect on students, taking away from relationships, isolating students, taking away from the individualized learning experience, and increasing anxiety. This article also discusses the effect of technology on the gap between social classes, making similar conclusions about technology thus worsening the gap economic differences make.

It is clear from the information given that teachers need training on how to use technology in a way that encourages rather than hinders relationships, collaboration, human interaction, and social growth among students. Technology has pitfalls in this area and it takes training and intentional effort to avoid them.

A survey study of 320 middle school students across Alberta, conducted by Labonté and Smith (2022) analyzed students' self-directed learning with and without technology use. They found that students' self-directed learning was reliant on the instructional quality of their classes, regardless of the use of technology, and that when using technology, students reported less

collaboration with peers. It suggested using technology to improve collaboration and giving professional development for how to use technology for student motivation and collaboration.

The fact that the instructional quality of the classroom has more to do with a student's engagement and success in self-directed learning than technology use suggests how a student is encouraged and motivated, and how they are taught to use technology has more of an impact than the technology. More effort then, should go to the things that make a greater impact.

Both of these studies further prove the point that superseding factors determine the effects of technology. From these studies we can see that more teacher training is necessary to help ensure that technology has positive effects on students' social-emotional well-being because of the many pitfalls that can get in the way. Students need motivation and guidance, not free reign.

Other Effects on Technology and of Technology

Beyond the effects on students, technology has substantial effects on other participants in the education system such as teachers, admin, families, etc. While students' needs come first in educational decisions, we would be amiss to ignore technology's impacts in these significant areas along with its impacts on students' educational and social/emotional wellbeing.

Timotheou et. al. (2022) conducted a literature review with the purpose of analyzing how the impacts of ICTs on the various participants in the education system are intertwined. The study concluded that ICT integration influences not just student performance, but many other aspects and stakeholders of the education system such as with the assessment process and the communication of results. It found that using ICT impacts students' knowledge, skills, attitudes, and emotions. For example, it saw that using tablets can help increase students' note-taking, organizational, and communication skills. The study also mentioned how technology can have major positive effects on topics like inclusion and equity and even the gender gap.

Technology has many effects on many people when it is used in education and none of these effects should go unnoticed. Just as it is important to consider all factors that make technology use good or bad, so also is it important to keep watch on all spheres of its impact.

A study done by Dogan, Dogan, and Celik (2021) looked at the effects of technology support, a teacher's confidence in technology use, their beliefs surrounding technology use, and their perceived skills in using software. In this correlational observational study, 1335 K-12 teachers across Florida were surveyed. The study found that the highest contributing factor to the teacher's use of instructional and application technology was the teacher's perceived skills therein. The study says that their data shows that if teachers knew more about how to use technology well and were more comfortable with it, they would use it more often. The main limitation of this study is that they can only claim correlated rather than causal relationships.

Basically, the study claimed that the effectiveness of technology use is hugely determined by the teacher's comfort and abilities in using the technology. This may seem obvious, but it is still a significant finding. Teachers need to know how to use technology very well and comfortably if technology is to be fully embraced in the classroom setting. More professional development, like one of the previous studies said, would be beneficial.

In conclusion, it is clear that much more than just students are affected by technology use and, again, much more influences the effectiveness of technology than just the technology itself. Teachers are hugely affected by technology and hugely affect technology. The relationship between teachers and technology is one that must be grown and made healthy for effective use.

More Specific Technology Uses and Their Effects

In addition to all of the effects of more general technology use in the classroom, there are more specific effects that come from the more specific technology uses. For instance, the recent

Covid-19 lockdown's bringing virtual classrooms is certainly worth note. Also, technology programming classes and special education uses for technology bring new questions and information to the discussion of what technology's place in education does and should look like.

A study by the authors Bird, Castleman, and Lohner (2022) sought to discover what the effects of virtual instruction in the midst of the covid-19 shutdown had on community college students from 23 schools in Virginia. It sawthat online learning negatively impacted students' academic performance, but that the students were not affected long-term after school went back in-person. Two limitations of this study is that it was done on college rather than elementary students, and that grading leniency during the shutdown could have affected numbers.

Regardless, it is certainly worthwhile to see how virtual courses are generally worse for learning. Teachers, and even students, may strongly prefer it because of the flexible nature of it, but these benefits are not necessarily worth the drawbacks. Other factors that were going on at the time that could and would influence student performance include the health difficulties of covid-19, but even so, online learning was not as effective as in-person..

A study done by Humble (2023) sought to look at what adding programming instruction affords to mathematics and technology classes in secondary schools. This qualitative study interviewed 19 Swedish secondary teachers who used programming in their courses. It found that programming can afford students flexibility, creativity, efficiency, visualization, fun, curiosity, play, holistic views, fearlessness, and interdisciplinary collaborations. A theme throughout the study is that incorporating programming allowed students to learn more thoroughly, though in some cases it meant they learned fewer concepts. The main limitations of this study include the fact that it was an interview study that relied upon honesty and that it only involved 19 teachers.

It would be good to see more data on the effects of incorporating programming instruction into K-12 classrooms. The information from this study shows that specific technology instruction, though not always the broad use of technology, can be beneficial for students.

A review of 126 literature publications done by Olakanmi et. al. (2020) sought to provide insight on the current uses of technology in special education such as assistive technologies and others. The results showed that most studies have focused on using technology in the game sense, that most looked at how technology use affected learners' cognitive skills, that most participants have been pre-college students with learning disabilities, and that the most studied topics were in the field of the natural sciences while those in the field of job skills were among the least studied. The authors suggest in their conclusion that more studies focus on how technology does and can impact learning for job skills for students with disabilities.

I agree that this would be well worth it. For students with severe disabilities in particular, the main goal is to give them self-sufficiency, which largely involves equipping them with job skills. If technology can be used to give students what they need, then it should be used to do so.

It may be reasonably concluded that technology can create many problems when used in general, but that when it has specific purposes or is being used for specific technology lessons, it can lead to valuable student growth and development in many areas. In other words, as always, there is a need to look at the context of technology before it can be deemed a benefit or a harm.

Discussion and Conclusions

It is clear from all the research that the effects of technology use in the classroom and in the education system depend greatly on several key factors. Though the studies were done on some vary different populations, with even different purposes and methods, all point to the concept that the purpose of the technology, who is using the technology, and the familiarity with

and access to technology of those users all play bigger roles in whether technology brings a net gain or a net loss to each described area of impact than the technology itself.

Recommendations for Technology Use and Training

Based on the discussed and reviewed research, it is my suggestion that technology use in education be taken much more seriously than it has been. Every teacher must consider its effects on his/her students and weigh its effects. There is a balance to it and I fear many teachers have missed the mark. Options should be given to teachers to work within their bounds of familiarity, but they should be trained in order to increase what they are familiar with. To best equip teachers to use technology, more comprehensive and data-based professional development should be given to teachers. Teachers must be educated on technology and all its benefits and drawbacks as well as on how to use it to their advantage. They need to be trained to use it responsibly and as a tool for learning, not as a crutch or a hindrance. Teachers cannot just be trained on the programs the district wants them to use, but on the entire concept and use of technology as a whole.

Final Thoughts and Recommendations for Further Research

In conclusion, technology can be a wonderful and life altering tool for students and teachers. However, its immediate appearance of perfection and innocence melts away upon closer examination. Nearly everything in life is only good in moderation and technology in the classroom is not exempt from this notion. We have a duty to prepare the next generation for the world of technology they are entering, but we cannot become slaves to it or overly reliant or trusting of it. Our students must come first, so careful study and inspection of technology use in the classroom is a duty of every teacher. Further research must be conducted as technology shifts and grows. We have to know where to head and be intentional about it. Intentionality is perhaps the best word to describe what technology must be approached within the world of education.

Bibliography

Alumaind, K. (2019, October). *Four ways technology has negatively changed education. Research Gate*. Journal of Educational and Social Research, 9(4), 10-20, DOI 10.2478/jesr-2019-0049.

Bird, K. A., Castleman, B. L., & Lohner, G. (2022). *Negative impacts from the shift to online learning during the COVID-19 crisis: Evidence from a statewide Community College System*. AERA Open, 8(1), 23328584221081220. https://doi.org/10.1177/23328584221081220

Bryant, J., Child, F., Dorn, E., & Hall, S. (2020, June 12). *New Global Data Reveal Education Technology's impact on learning*. McKinsey & Company. https://www.mckinsey.com/industries/education/our-insights/new-global-data-reveal-education-technologys-impact-on-learning

David, L., & Weinstein, N. (2024). Using technology to make learning fun: Technology use is best made fun and challenging to optimize intrinsic motivation and engagement. European Journal of Psychology of Education, 39(2), 1441–1463. https://doi.org/10.1007/s10212-023-00734-0

Dogan, S., Dogan, N. A., & Celik, I. (2021, January). *Teachers' skills to integrate technology in education: Two path models explaining instructional and application software use - education and Information Technologies*. Education and Information Technologies 26(4), DOI:10.1007/s10639-020-10310-4

Humble, N. (2023). *A conceptual model of what programming affords secondary school courses in mathematics and Technology.* Education and Information Technologies, 28, 10183–10208, https://doi.org/10.1007/s10639-023-11577-z

Labonté, C., & Smith, V. R. (2022), Learning through technology in Middle School classrooms: Students' perceptions of their self-directed and collaborative learning with and without technology. Education and Information Technologies, 27, 6317–6332. DOI: 10.1007/s10639-021-10885-6

Olakanmi, O. A., Akcayir, G., Ishola, O. M., & Demmans Epp, C. (2020). Using technology in special education: Current practices and trends. Educational Technology Research and Development, 68(4), 1711–1738. https://doi.org/10.1007/s11423-020-09795-0

Park, S., & Weng, W. (July 2020). The Relationship between ICT-related factors and student academic achievement and the moderating effect of country economic index across 39 countries: Using multilevel structural equation modeling, Educational Technology & Society, 23 (3), 1-15.

Timotheou, S., Miliou, O., Dimitriadis, Y., Sobrino, S. V., Giannoutsou, N., Cachia, R., Monés, A. M., & Ioannou, A. (2022, November 21). *Impacts of digital technologies on education and factors influencing schools' digital capacity and Transformation: A Literature Review*. Education and information technologies. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9684747/

Wang, J. C., Hsieh, C.-Y., & Kung, S.-H. (2023). The impact of smartphone use on learning effectiveness: A case study of primary school students. Education and Information Technologies, 28(6): 6287–6320, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9651103/

Woodhouse, H., Passey, D., & Anderson, J. (2024). Using digital technologies to build connections between families and schools as children transition to school. Education Sciences, 14(5), 520. https://doi.org/10.3390/educsci14050520