

**Infusing Technology into the Classroom and Engaging Students in a Digital Age  
An Informative Guide for Educators from a Gen-Z**

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## **Infusing Technology into the Classroom and Engaging Students in a Digital Age An Informative Guide for Educators from a Gen-Z**

### Introduction

Modes of learning have changed dramatically over the years in regards to how we interact with information, learn material, and teach complex academic topics. As the digital world advances, we have already seen how the inclusion of technology in the classroom to complete assignments or teach lessons have changed the way we view education.

When we think of integrating technology into the classroom, what does this mean and what implications does it have? What does a learning institution that infuses educational technology in a balanced way look like? How is it perceived by students, parents, etc. Are there collaborative modes of participatory learning that helps to rethink traditional pedagogical methods with the inclusion of technology as a method of learning?

It can be argued that some learning institutions have been slower in keeping up with the advances in the digital age, thus unbeknownst to them, have chosen to limit or completely eliminate the use of technology in the classroom. Why might educators choose to limit technology when teaching? Well, the answer is simple: traditional styles of learning (without digitized methods) have been incredibly effective and successful! However, as our young children develop - it will be beneficial for them to know how to navigate the digital world effectively, with balance, and use technology in educational ways that enhance their learning and productivity. With that being said, please do not misinterpret my message as being an advocate for ONLY technological learning methods. I believe that just like in any other area of life, technology must be used mindfully, and with balance - especially in the classroom. Thus, *responsible educational technology* is a term I would like to use to emphasize using technology in education as a way to *enhance* learning while not being a distraction, and diminishing student-teacher relationships. I envision *responsible educational technology* benefiting humanity through greater open dialogue, creative innovation, and increased outlets to evolve ideation.

*“In essence: It is my hope that thinking about the potential of new ways of learning might inspire the revitalization of academic institutions through educational, technologically balanced methods that strive to ameliorate the human mind and inspire those that seek to transpire alongside the digital world.”*

-Keegan W. Lee

## Section 1: Participatory Learning

According to the science of pedagogy, active learning and participation are high determinants of academic success regarding the retention and interest in academic material among children, adolescents, and young adults. A key factor when considering changing learning institutions through the inclusion of technological learning methods is *participatory learning*. Traditionally, this way of learning would be demonstrated by the *socratic* method of learning which is a form of dialogue in a classroom that involves engaging the class through asking and answering questions (an incredible method of pedagogy I might say). However, what might this look like with the *responsible* inclusion of technology? In a digital age, this would appear as using technology to spark participation through virtual apps, platforms, and communities to share ideas, comment, ask questions, and implement goals together.

What kind of ways might technology be used? I will share some of my selected personal favorite ways of using technology to learn and especially participate.

1. **Kahoot!** - Kahoot! is a Norwegian online game-based learning platform. It has learning games, also known as "kahoots", which are user-generated multiple-choice quizzes that can be accessed via a web browser or the Kahoot! App.
2. **Google Jamboard** - An engaging way of learning that can be shared with all students to spark inclusive dialogue and creativity. Google Jamboard is like an online web whiteboard where students can simultaneously collaborate by adding their own ideas, questions, etc. through drawings, text, sticky notes, and more.
3. **Poll Everywhere** - an online platform that educators can use if they want to spark participation by using online polls that can instantly be seen and analyzed by the audience. This is a great platform to use if you want to spark dialogue, negotiation, dialogue, and perhaps controversy.
4. **YouTube** - a widely used social media platform, however, great for finding information about specific learning material that you want demonstrated in a fun, animated way other than lecturing. As a college student, whenever professors use YouTube videos to enhance,

elaborate, or explain their point, I always see it as a nice “brain break” and different way of learning the material that helps me memorize concepts more efficiently.

5. **Class Dojo** - this platform would most likely be used for more elementary, middle, or high schools with smaller, intimate classrooms, however, it is an incentive-based app that allows students to earn “points.” When my teachers used this in 5th grade, I remember just how much student’s participation increased because of the eagerness to receive more “Dojo” points that would lead to prizes or rewards such as 3 extra points on a quiz, or homework assignment, etc.
6. **Quizizz** - An application that quizzes students through live games with the inclusion of using humor as a mode of learning as well as leader boards, points, and powerups.
7. **Any type of live discussion board**- These include any form of live digital discussion where answers can be seen immediately, and in real time. This helps foster discussion in the classroom, and is incredibly useful.

Using technology in a digital age to increase the efficacy of learning has become an incredible medium, especially for Gen-Z who are known to find creative, integrative, and interactive styles of pedagogy the most effective in engaging and retaining material. Although the inclusion of technology as a way of learning in the classroom may not seem exotic, rare, or completely new due to how Gen-Z was born into an age of the internet and social media, it IS noticed, appreciated, and valued when used to spark conversation and amusement.

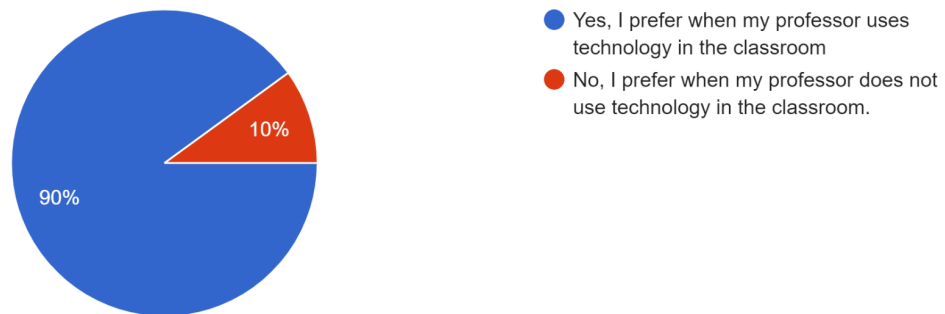
## Section 2: Quantitative Data from Undergraduates

The following data was collected from a small sample of first-year students at The University of North Carolina. Students in this class had just completed a semester of college to which they witnessed various forms of pedagogical elements in the classroom. They were questioned on factors regarding use of technology as a way to enhance knowledge. They were surveyed through a Google form which presented automatic quantitative data.

**FIGURE 1: PREFERENCE OF TECHNOLOGY IN THE CLASSROOM**

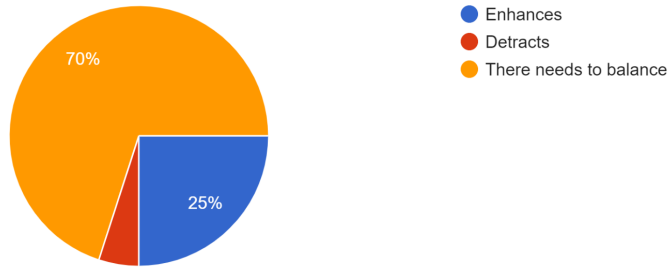
Do you prefer when your professor uses technology as a way of learning in the classroom (I.e to spark participation, using videos, creativity, etc.)

20 responses



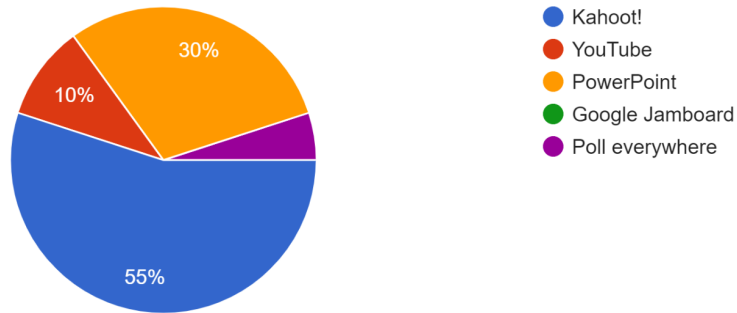
**FIGURE 2: ENHANCEMENT OF LEARNING WITH TECHNOLOGY IN THE CLASSROOM**

Overall, do you believe technology enhances your learning or detracts from it?  
20 responses



**FIGURE 3: PREFERENCE OF APPLICATIONS**

Which of the following platforms do you enjoy the most when your teacher has used them in the past?  
20 responses



Other educational technology platforms that were recommended in the survey include:

- Anonymous discussion boards
- Gimgit
- Iclicker
- Jeopardy
- Quizizz
- Recording lessons and using live subtitles



- TikTok
- Spotify integration

According to the above data, it is obvious that most undergraduate students (from a small sample size) declare technology to be a positive addition in the classroom to help aid learning. In addition, most believe that there needs to be a balance of both traditional and technologically based teaching methods in the classroom.

### Section 3: Incentive-based Technology

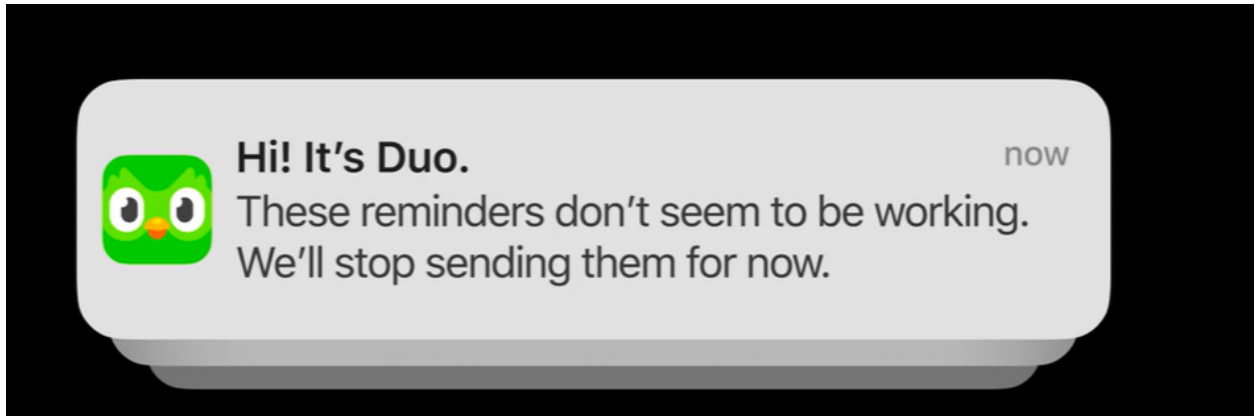
Let's take an analytical look at one of the most productive and successful learning platforms to exist: Duolingo. This is a world-renowned language learning app that was created by Luis Von Ahn. What makes this app so addictive and fulfilling? It uses the same psychological tactics as social media platforms like Instagram and Tik-Tok. In his famous Ted Talk, Luis Von Ahn says that learning from a Smartphone is almost impossible because of its high distractibility and numerous outlets that divide attention from what might be deemed as important. In other words he describes learning from a Smartphone as: *“Hoping that people will eat their broccoli, but right next to it, you put the most delicious dessert ever made. If you want to deliver education to all, you have to make it so that people actually WANT to learn. We have done this by making broccoli taste like dessert.”*

**Please watch Luis Von Ahn's Ted Talk: [HERE](#)**

Let's take a look at some of the powerful algorithmic tactics that Duolingo uses to literally make learning addictive.

1. Streaks - a feature that keeps track of how often you use the app. If you do not use the app within 24 hours, you will lose your streak. From a motivational perspective, people DREAD losing their streak, just as they do on Snapchat.
2. Gamification: Duolingo turns language learning into a game-like experience by awarding points, leveling up, and encouraging users to compete with friends or other learners.
3. Bite-sized lessons: Duolingo breaks down language learning into small, manageable lessons that can be completed in a few minutes each day. This approach helps users stay consistent and motivated.

4. Interactive exercises: The platform offers various interactive exercises like translation, listening comprehension, matching, and speaking activities to practice different language skills.
5. Immediate feedback: Duolingo provides instant feedback on user answers, indicating whether they are correct or need improvement. This immediate feedback helps learners understand their mistakes and improve faster.
6. Skill levels: Duolingo divides language courses into different skill levels, ensuring that users start with basic concepts and progressively advance to more complex grammar and vocabulary.
7. Repetition and spaced repetition: Duolingo uses spaced repetition, which means that it revisits previously learned material at intervals to reinforce knowledge and help users retain information in their long-term memory.
8. Reminders: Duolingo encourages users to maintain a daily learning streak by sending reminders and notifications, motivating them to practice regularly. Very similar to the assortment of notifications sent by various other social media platforms. In-fact, Duolingo actually knows the BEST time to send notifications. That is, 24 hours after the individual last used the app. That is because if you were free yesterday at 3pm, you are free today at 3pm. Additionally, Duolingo will send some “passive aggressive” reminders to get people to keep learning. What do you think people do when they receive the notification shown below? **THEY COME BACK!**



9.

**FIGURE 4: Addictive Duolingo notification**

10. Immersion exercises: Duolingo allows advanced learners to practice their skills by translating real-world texts from the web, providing a more challenging and practical experience.
11. Community engagement: Duolingo offers discussion forums, clubs, and social features to connect learners with a community of language enthusiasts, providing a sense of support and encouragement.
12. Adaptive learning: Duolingo's algorithm adapts to individual learning styles and tracks progress, adjusting the difficulty of exercises and content based on a user's performance.

As a frequent user of Duolingo to help with my Spanish, I can say it is incredibly effective. But, how can you apply this to other subjects? Well, most things that require meaningful retention of knowledge are garnered through repetition. Anything with repetition has the potential to be gamified. Mathematics, social sciences, language learning, science, etc. can all be gamified by using addictive tactics similar to Duolingo to enhance learning.

## Section 4: The Digital Divide

As a student, there have been several times where students have had to help instructors of older generations navigate technology so that they could know how to properly teach. As a Gen-Z who was born into a world of advanced technology, I completely understand this generational gap of technological knowledge to which we call *the digital divide*.

A large part of responsibility using technology in the classroom is not just about *which* applications or educational methods to use to teach, but it is also about knowing *how* to use these mediums and learning to effectively navigate to digital infrastructure. By developing and understanding how to teach with technology, teachers can also play the role as both instructors and learners in an educational setting. Thus, it would be rational for teachers to reach out to their peers and even students to help support them in navigating new technologies. I believe there should be adequate training in place to help support educators who may not be as digitally adept and want to use technology as a way to aid learning in their classroom. The training should match the teacher's needs, emphasize their comfort with technology, and motivate them to use technology as one of many tools utilized in the classroom.

The incredible success of using technology in the classroom has initiated a greater number of skills training for educators. It is believed that if a teacher understands how to navigate technology, students would be able to learn more quickly and proficiently. However, there are challenges to this statement. Despite the access to technology-skills training, educators remain hesitant to use technology in the classroom. Surprisingly, skills training often does not result in altered instructional practice. This occurs because of three main limitations in technology-skills training:

1. Technology and curriculum may appear as separate entities in the minds of educators, where technology remains the primary focus and curriculum remains the secondary focus. This makes technology manipulations seem all the more worthwhile.
2. Skills training might present the notion that educators **MUST** be experts in technology in order to be successful in their pedagogical methods. However, this simply is not the case and should never be expected to be true. Because teachers

may think they lack the adequacy and knowledge to use technology, they may eliminate it all together.

3. Training sessions are long and extensive, sometimes taking several hours per application. This might lead educators to believe that they will need to devote a larger amount of time to teaching themselves the technology as well as their students if it is something they are not familiar with.

However, I have hope that with the proper infrastructure and technological skills training that emphasizes educational technology integration in the right ways, these sorts of problems and misinterpretations can be avoided. How are we going to do this? I have a few suggestions:

- Skills training should be focused on a BALANCED perspective of both traditional forms of teaching (i.e., lecturing, open dialogue, socratic methods, group discussions, etc.) and the implementation of technology to eliminate any forceful information that educators NEED to be experts in digital navigation.
- Skills training should emphasize the importance of using technology as a tool to enhance present curriculums. Curriculums should be the MAIN guide to teaching in the classrooms without technology being the focus. Allow technology to be seen as a small instrument a part of a band. Not the conductor. This will potentially get rid of the pressure to focus on technology as the main medium in the classroom.
- There needs to be support from educational technology specialists. Educational institutions can appoint educational technology specialists who can provide ongoing support and guidance to educators. These specialists can work closely with teachers, offering advice, troubleshooting, and assisting with integrating technology effectively into their classrooms.
- It will be important to involve student feedback to ensure that the ways educators are using technology are aligning with their learning needs.

These are just a few recommendations: however, implementing technology in the classroom, while incredibly useful, successful, and productive, is a collaborative effort that takes effort and patience from all individuals involved.

## Section 5: Professional Development: Focus on the Teacher as a Learner

Although technology is an incredibly useful tool in the classroom as we have discussed, it is actually suggested that professional development should promote technology integration while actually minimizing the use of digital devices in the classroom and using them only when needed and desired for educational prosperity.

The 5J approach to educational technology implementation ensures that digital learning is intentional and used responsibly.

- **Job-related:** Focused on classroom (i.e., instructional and curricular) needs.
  - The classroom is a system and digital devices such as computers are just one part of the system that supports learning and allows work to be accomplished more efficiently. It is a small component of the classroom-management strategy. Technologies are incredibly versatile and have the capability of responding to various instructional needs depending how the educator chooses to tailor their lessons. We must not forget however, the beauty of hand-held books, journals, papers, maps, art supplies, and other mediums as wonderful educational tools as well.
- **Just enough:** Demonstrating balance, and not overuse with digital devices (i.e., computers, tablets, etc.)
- **Just in time:** Giving educators the skills they need with the tools they have accessible.
  - Additionally, professional development coaches must question educators on their learning goals and progression.
- **Just in case:** Recommending that teachers have the knowledge on how to proceed with technical malfunctions.
  - This means that it would be recommended for educators to articulate their concerns and fears with technology use in the classroom such as: a shortage of digital devices for a large class, students becoming confused about tech software, etc.
- **Just try it:** Encouraging a balanced use of ed-tech and supporting them in their choices to use digital means of education.



Overall, this 5J approach is a useful method for monitoring educator progression with technology and can improve student-teacher relationships as the educator consistently makes efforts to improve the classroom environment with the inclusion of technology whilst remaining traditional and focused on curricula.

## Section 6: Gen-Z and Educational Technology: Positives and Negatives

As an undergraduate student, I can confidently say that technology is life changing in so many ways. From creative expression to work productivity, I am grateful to be a student in an age that has such quality digital advancements that allow me to learn and grow personally and academically. However, there are times when technology detracts from my ability to learn, but can also have negative implications on how I perceive myself. Below is a table that I have created to show some of the POTENTIAL positive and negative (by negative digital overuse in educational settings) implications for educators to be aware of in the classroom. We must always be keen to see both sides of the spectrum.

**Of course, these are not all of the positives and negatives, and they are subjective. These are only the implications that I have selected.**

Positives	Negatives
Creative expression	Distractibility: technology has a high level of distraction that can actually limit work productivity
Increased work productivity	Consistent notifications: technology offers several different notifications that can cause stress especially if students are always receiving information about their grades and academic performance.
Increased time management due to ability to work remotely	Can inhibit collaboration in the classroom if being used at the wrong time.
Increased space for digital dialogue and commentary	Constant updates and learning curve: The ever-evolving nature of technology means that teachers must continually stay updated with new tools, apps, and platforms.
Increased allure through learning applications that obtain gamification, incentives, and reward.	Overemphasis on digital skills: While technology skills are important, focusing too much on technology integration can overshadow the development of other essential skills such as critical thinking, problem-solving, creativity, and collaboration.

Personalized learning: working at one's own pace and level.	Increased risk of cheating
Real-world application: Technology can create opportunities for real-world application of knowledge through virtual field trips, simulations, and online research.	High rates of misinformation
Global connection and cultural awareness: Technology enables students to connect and collaborate with peers and experts from around the world, fostering cross-cultural understanding, global awareness, and empathy.	Access and equity: not all students have equal access to technology.

How can we improve upon some of the negative implications of ed-tech that was mentioned above? I have listed some possible solutions for each one:

<b>Ed-tech problem</b>	<b>Potential Ed-tech solution</b>
Distractibility: technology has a high level of distraction that can actually limit work productivity	If you are in the classroom, educators can choose to collect devices at the beginning of class to limit distraction. However, it is a large class, you can tell students to put away all devices. (You cannot guarantee they will listen, however, making that comment is better than nothing!
Consistent notifications: technology offers several different notifications that can cause stress especially if students are always receiving information about their grades and academic performance.	Limit the reminders and notifications that are sent to students and ensure they are intentional. Reminders and notifications are important, however, it may help if they are timely.
Can inhibit collaboration in the classroom if being used at the wrong time.	Ensure that when students are supposed to be participating in open conversation through face-to-face interaction, make sure they are present.
Constant updates and learning curve: The ever-evolving nature of technology means that teachers must continually stay updated with new tools, apps, and platforms.	Make sure to consistently attend skills training and ask peers, students, administrators etc. for support as you learn to navigate technology. It is difficult, and you must be patient. If your students are kind (I

	<p>am assuming they would be) they should not mind, and from what I have seen, my peers genuinely enjoy helping out their educators with technology.</p>
<p>Overemphasis on digital skills: While technology skills are important, focusing too much on technology integration can overshadow the development of other essential skills such as critical thinking, problem-solving, creativity, and collaboration.</p>	<p>Ensure that there is balance of technology use and free range of thought in the classroom. We have discussed this several times, however, it is vital. Give your students opportunities to be present, immerse them in boredom and give them an idea to ponder about with themselves or each other - without the support or data from the internet. This will maintain the art of creativity and critical thinking. Then, allow them to access their devices for support of their thoughts and ideas. See, balance IS possible!</p>
<p>Increased risk of cheating</p>	<p>Unfortunately, students are sly these days and catching a student cheating is often quite difficult. But there are ways that you, as an educator can become more keen at spotting plagiarism, AI use, or just plain cheating.</p> <ul style="list-style-type: none"> <li>● Vary assessment methods: Utilize a variety of assessment methods, such as written exams, projects, presentations, and group work.</li> <li>● Design authentic assessments: Create assessments that require critical thinking, problem-solving, and application of knowledge.</li> <li>● Monitor during assessments: During exams, strategically position yourself in the classroom to observe students' behaviors.</li> <li>● Use technology tools: Some technology platforms offer features to monitor and prevent cheating during online assessments. <ul style="list-style-type: none"> <li>- These tools can include features like blocking external websites, locking down browsers, remote proctoring, or using plagiarism detection software to identify copied</li> </ul> </li> </ul>

	content.
High rates of misinformation	Educate your students on what is deemed as true versus false information. This will also be an important skill for them to apply to their real lives, especially as they navigate social media.
Access and equity: not all students have equal access to technology.	Unfortunately, this is the truth, but there are ways to help and support students that do not have access to technology. <ul style="list-style-type: none"><li>● Provide technology resources at school</li><li>● Loan devices to students</li><li>● Provide internet connectivity</li><li>● Incorporate alternative teaching methods</li></ul>

## Section 7: Theories from Educators on Educational Technology

You have heard from young students on their thoughts using technology in the classroom. Now, let's hear from educators about why they might use technology as an aid for learning.

**TABLE 1: Selection of theories employed in ed-tech research (Bulfin and Johnson, 2015).**

Main Theoretical Approach	Appeal and strength of these theories
A positivist-interpretivist continuum (Advisor on technology enhanced learning)	"I believe that educational research Needs to be based on a pragmatic methodology which enables a combination of features of a positivist approach with elements of an interpretivist approach."
Cultural studies; critical Communications (Assistant professor, Sociology of Education)	"Cultural studies and critical Communications require that one interpret the relationships between education and digital media within a broader context."
Social cognitive models (e.g., theory of planned behavior); motivation theory); affordance theory (Associate professor, Computer Science)	"I am searching for theories and models that have explanation power not available in the current theories/models used by educational technology or present an alternative perspective on the problem to be solved."
Simulation fidelity; motivation; situated learning; cognitive development; expertise;cognitive load theory; generative learning; problem solving (Associate professor, Instructional Design)	"I prefer to use theories that do not constrain me to a particular media, rather study the processes associated with learning and use the media to leverage approaches."
Exploration of pedagogy-andragogy-heutagogy continuum; multimodal learning theory; social network theory (E-learning designer, Communications/Media)	"Their strengths are that they are not related to the technology themselves; rather they are related to the purposes to which technology is used in the daily lives of people and in formal and informal learning situations."
Constructivism; metacognition; inquiry-based learning; interaction design (PhD candidate, Communication)	"I have found that they are valuable in the context of learning in the "digital age." They provide conceptual understandings of how students can learn to become independent and

	lifelong learners.”
Critical theory; cultural studies; media; ecology; phenomenology (Professor, Education)	“I began my research in educational computing using critical theory and cultural studies because I was disillusioned by ed-tech research in general and was interested in critiquing the conversation itself.”

Other reasons why educators have integrated technology into their classrooms:

- Support of student learning
- Technology nurtures the class as a learning community
- Could be used to individualize learning
- Easily accessible to students
- Increased sense of belonging in the classroom by allowing students to have ownership of classroom technology resources
- “Many children do not like pen and paper so technology offers a way for them to learn that is not book learning.” (primary school teacher)
- “Children use their own technology at school so it helps to cross the boundaries between home and school.” (primary school teacher)
- “I like students to have the freedom to work at their own pace and explore their own special interests within an area of study.” (primary school teacher)

The educator’s experience with technology does not indicate they are against it, but rather advocate for the use of digitized methods of learning for the benefit of their teaching and their student’s learning. Importantly, this research indicates that educators are shaping and priming their student’s minds with educational technology without the guidance or assistance of research or science - but making their own self-discoveries of what works and what doesn’t in the classroom.

## **Section 8: Conclusion**

Why am I so passionate about educational technology? Well, for one, I love to learn. I believe that learning should be something that is enjoyable, appreciated, and enticing. Educators are at the very heart of molding the minds of the next generation. Their methods of pedagogy are essential to student motivation, performance, and outlook in academia. As our digital world continues to advance, we, as students, parents, and educators, and all people, have the responsibility to grow with it. This means adapting to the newest technologies, applications, and social networking platforms to develop the best modes of teaching. However, this takes work. This takes effort. This takes patience. This is why not one educator can do it alone. Just as we have discussed above - the integration of educational technology takes a supportive network of all people in the academic institution to strive to learn the most effective and efficient that it can be.

I hope that this guide provided you with knowledge about the benefits of using technology in education, while remaining diligent and keen to focus on traditional methods of teaching. I hope that this guide has given you new ideas on how you can use technology to improve your teaching philosophies, and in turn, your student's lives.

Thank you,

Keegan Lee



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