An Overview of Educational Technology for Preservice Teachers in the Digital Age

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Abstract
Technological tools, including networking hardware, media, and machines, have been incorporated into education to facilitate learning for many decades. The conveyance of knowledge through technology becomes fast, easy, and enjoyable for the learner while vastly improving the understanding of concepts. Research insights reveal that through the use of technological tools, the participatory capacity of students increases, and interest levels are raised. Education has evolved, over the centuries, in its form, nature, and manner of deliverance. When written communication had not yet developed, word of mouth and observation were the most common means of passing knowledge from one generation to the next. Teaching was mostly verbal, delivered through plays, songs, and poems. Writing as a means of communication only gained significance by the end of the 15th century. The use of chalkboards and blackboards as a method of learning and teaching gained popularity at the end of the 18th century. Still, now in the 21st century, more advanced technological tools play an important role in facilitating learning and teaching. This study examines the effectiveness of educational technology in English teacher education programs, emphasising the development of preservice teachers' language and pedagogical skills.
Keywords: Educational technology, Digital age, Preservice teachers, English skills, Pedagogical skills.

Introduction

In partnership with the BBC, an open university televised an educational TV series for students in the UK in 1968. International agencies have made efforts to spread video educational technology to less-developed countries; however, these efforts were less successful due to a lack of electricity, unfavourable weather conditions, and language barriers. In 1983, India initiated the broadcast of a regional educational series across the country, especially aimed at indigenous communities, using its first satellite. After that, major and rapid strides have been made in the innovation of high-speed digital technologies and the Internet, resulting in the widespread use of video media for classroom learning. There has been a significant reduction in the cost of video production and transmission due to innovations, contributing to its greater use in classrooms and lecture halls. The invention of the moveable PC contributed significantly to facilitate the quest for quality education. There have been several innovations

in computers by entities such as Toshiba and Apple. A relevant and commendable invention was that of the first digital assistant in 1993 by Apple Inc. for classrooms. Studies show that many learning institutions in the US had stable Internet connections and computers by 1998.

Information technology and computers in teaching and learning have gained significance in the 21st century. Mobile technologies, new models of education, open-source and open-access movements, and social networking sites have transformed learning and teaching practices (Siemens & Conole, 2011; Siemens & Tittenberger, 2009). Web-based tools such as e-books, blogs, wikis, podcasts, and online videos have significantly facilitated multisensory learning and multimedia computing. Technology has advanced in leaps and bounds and has given rise to new forms of communication, interaction, expression, and entertainment (Shelly et al., 2010). These advancements have challenged teachers to abandon their traditional ways of transferring knowledge (Wiske, 2004). Various technological tools are now used for learning, and these have created new challenges for the current generation of educators (Corrrin et al., 2011). In addition, the nature and perspective of learners have been transformed by the evolution and explosion of social networks.

Today, most students are likely to have accounts on sites and applications like Google, Twitter, Linked In, Facebook, Flickr, and Picasa, facilitating students' associations with their teachers and fellow students (Downes, 2010). The future of educational technology, with myriad inventions and improvements, promises to make student-teacher and student-student relationships much more efficient. There are new methods of communication available for lecturers to engage with their students one-to-one on social media platforms and social groups for students to engage with each other. Students can conduct their research using Google and many other Internet communication avenues, such as Google Meet, Skype, etc. Google is looking into developing reality glasses to serve as the new means for learning; students will need to wear reality glasses, and educational material will be transmitted through the lenses of the glasses.

The significance of educational technology became evident during the COVID-19 pandemic; were it not for technology, millions of students globally would have had no access to education during the long but imperative lockdowns. The cost of education is high, and some people may be unable to afford long breaks due to the global shutdown of most learning institutions. However, most students have been able to complete their learning and have even graduated virtually thanks to the technology of remote learning. The outbreak of COVID-19 necessitated measures such as social distancing, spawning a massive increase in e-learning globally, whereby learning has been pursued on digital platforms from the comfort of students' homes. One of the worlds' most highly valued education technology companies, BYJU'S, an online tutoring platform and educational technology company based in Bangalore, has offered free access to its services to facilitate learning during the era of COVID-19. The Chinese government instructed students to resume learning through online sessions, which has led to the increased use of Tencent classrooms. The move resulted in about a quarter of a billion full-time online students, the most significant online learning movement in education history.

The technology company, ByteDance, developed the Lark Suite to provide a one-stop-shop for teachers and students. The development aimed to provide students and teachers with unlimited auto-translation capabilities, video conferencing time, intelligent calendar scheduling, and real-time co-editing of project work, among other features. DingTalk, which Alibaba developed to cater to distance learning, had to make major adjustments to accommodate the unprecedented large-scale increase in remote work. It set a record for rapid capacity expansion by launching over 100,000 new cloud servers in approximately two hours. There have been many partnerships formed to facilitate local educational programs that focus on broadcasting on various channels to cater to age diversity. One such association is the collaboration between PBS SoCal/KCET and the Los Angeles Unified School District. Media organisations are also attempting to participate in powering virtual learning, with the BBC launching Bitesize Daily to facilitate curriculum-based learning

across the UK for children. A few celebrities brought on board to teach content, like the Manchester City footballer Sergio Aguero.

Therefore, given this backdrop, this research explores the effectiveness of educational technology in English teacher education programs specifically for enhancing preservice teachers' language and pedagogical skills.

Educational Technology in General English Language Teaching

The steps in learning a language follow to learn to listen, speak, read, and write. These form the four learning skills for any language. This section of the paper reviews how educational technology tools can facilitate the improvement of language learning skills. Many people find it challenging to learn a new language. Still, even one's native language must be learned, and some people only manage proficiency in the first two stages of listening and speaking. In addition, most students struggle with reading and writing skills, and thus, if educational technology tools can help, it can be a significant milestone for many students. Furthermore, machine assistance will go a long way to help teachers who find themselves limited in assisting students seeking to improve their language skills.

Teachers are limited by their human capabilities, and thus the incorporation of technology in learning and teaching language skills can bring about efficiency and a better connection with students. The modern world is experiencing a high rate of globalisation. Therefore, teachers may find themselves working in different countries, and the challenge of the language barrier may come into play in education. In many home countries, learning and lessons may not necessarily be imparted in the medium of the native language. Still, there are circumstances that may necessitate using the native/home language, such as elaborating a point, informal communication, and even making jokes. Therefore, the technological educational avenues available may serve as a superior way to bridge this gap. The four language skills–listening, speaking, reading, and writing–are macro language skills; therefore, the role of educational technology in facilitating other micro language skills, such as vocabulary, pronunciation, grammar, and spelling, which are essential for effective and correct English communication, both spoken and written will also be discussed in this study.

Students rely on English language skills, such as reading, listening, speaking, and writing, to communicate effectively (Grabe & Stoller, 2002). The success in learning languages depends significantly on the methodology used by instructors in their classes (Ahmadi, 2017). One of the most successful instructional methods used in the language learning process is computers (Becker, 2002). Teachers can prepare sufficiently for lessons, and conveniently access their work, and may also avail themselves of some freedom in the setting of the curriculum. Most teachers appreciate computers as they are a highly suitable method for providing high-quality education.

One of the limitations for students learning English language skills is a lack of confidence and a preconceived negative attitude that maintains that it is a complex language to learn, especially when it is a second language. The use of technology can create interest and motivate students to accomplish mastery in English language skills. The educational technology tool that can help generate interest and motivation is computer-assisted language learning (CALL). It enhances learners' confidence and influences them to change their negative attitudes (Lee, 2001). In addition, the integration of information and communication technologies (ICT) into English language learning can be a catalyst to motivate learners and teachers, as they will be able to apply new ways to complement the traditional, less efficient methods of learning (Hennessy, 2005).

The benefits of using information communication technologies include the opportunity for learners to play an active role. Through active participation encouraged or motivated by the fascinating nature of technology, learners can retain more information on the skills acquired in the classroom session. They can even engage in follow-up discussions with each other and thus, absorb more information. Costley (2014) states that using ICT enables learners to engage with new educational materials, which improves their language learning abilities and skills (Costley, 2014; Tutkun, 2011). Traditional teaching

fails to achieve complete success because it is teacher-centric instead of information technology, which is more student-centric. This change improves the teacher's facilitative role in learning/teaching English language skills (Riasati et al., 2012).

Computer-based communication is an essential feature for assisting language learning (Eaton, 2010). The computer-based learning experience and its features are more convenient than face-to-face discussions. Language learning is more successful through computers because of access to authentic study material (Zhao, 2013). Learning English language skills requires good study course material and the ease of access and high speed associated with computers, which give teachers and students huge advantages (Rodinadze & Zarbazoia, 2012). Research conducted to establish the contribution of technology in language learning reveals that the integration of technology in the classroom improves learning, and this will be valid for improving student teachers' English skills as well (Baytak et al., 2011). Learners commented that the integration of technology in language learning made the learning session enjoyable. Other research results identified many common descriptive words and terms used by students to describe their experiences with technology in language learning like, "technology makes learning interactive," "exciting," and "increased social interactions," "learning engagement," and "motivation to learn."

Research to establish the contribution of technology in improving learners' reading and writing skills has found that technology tools improve learners' writing and reading skills. The factors leading to this success include the fact that technology features are user-friendly, and learners can learn more efficiently at an increased speed (Peregoy & Boyle, 2012). In addition, the study identified the Internet as a more convenient avenue for students as they had easy access to the lessons, and it provided a user-friendly environment for them.

In 2014, a study was conducted to identify whether using WhatsApp applications in English dialogue journals could improve learners' speaking ability, word choice, vocabulary, and writing skills (Alsaleem, 2014). The results revealed improved speaking skills, vocabulary, word choice, and writing skills of students attributable to WhatsApp. Another study on student motivation proved that students are more likely to be motivated when educational technology tools are used in class than when they are not (Godzicki et al., 2013).

Educational Technology for Improving Preservice Teachers' English Skills
Listening Skills

Listening skills can be enhanced in real-time, unlike reading skills; however, sometimes, it may not be easy to control the speed of the information that reaches the listeners. Educational technology can help students manage their listening skills through various digital technologies. Some of the apps include LyricsTraining, a mobile application that allows students to improve English language listening skills through songs. First, students listen to song lyrics, after which they can reconstruct the lyrics. The app enables students to listen to the song, one line at a time. Thus, students can listen repetitively without getting bored. Another technological tool to help with listening is Listen Notes, a podcast search engine which students can download on their mobile phones for review at their convenience.

Accent Rosie is an app that is integrated with Facebook for use by students. In this, students receive daily short audio clips in the accent of their choice, which they can listen to, transcribe, and submit back through Facebook Messenger. After submission, students get feedback on their submissions and can see what they have got right. TeachVid is an app for students that involves watching a video. Teachers can register in TeachVid, plan their teaching videos, and share them through classroom portals created in TeachVid. Read Aloud is available from Google Chrome or Firefox browsers. It is a text-to-speech voice reader that highlights text for students as it reads. The app opens text and reads to students. The Read-Aloud feature allows students to rewind if they feel they have missed or misunderstood something; they can even adjust the reading speeds to a level that they can follow conveniently. This feature enables the development of reading and listening skills, as the student can read along.

Synth is a feature that allows teachers to record podcasts, which can be audio files, questions, or

messages for students to read and post their replies. This feature enables dialogue with students and improves their listening and writing skills. Fluid Data is another tool that allows access to a vast collection of audio files to improve listening skills. One can type and search the word of interest, and Fluid Data will display several audio clips containing the highlighted phrase. It allows students to find example sentences on the use of the specific words they want to learn. Speak Pipe is an app that can help improve listening and pronunciation. It allows students to record example sentences of phrases that are known for future reference. Video Converter is another form of technology that can enable students to watch and listen and concentrate on the body language while matching it with the actual words in the audio track. It allows students to multitask. These are a few of the many technological resources available for use in improving student-teacher listening skills.

Speaking Skills

Communication laboratories enable students to record themselves and then playback the recordings repetitively until they are satisfied with their speaking skills. Through video conferencing, students can listen to and follow live discussions with their teachers and even other professors in foreign countries. Students can therefore learn speaking skills from some of their favourite, personalities. In addition, students can ask questions after the session and receive feedback immediately through live coverage. Another tool in speaking skills is the Video Library, which helps students who have missed their class sessions. Teachers can record their sessions and make them available for students enlisted on the Video Library.

Speech Recognition software assesses the accuracy of the student in reading text and provides feedback that is motivating, such as, "You sound great" or instructs the student to try again. In addition, the software can accord separate scores for the different aspects in speaking, such as accuracy in pronunciation, comprehension, grammar, and adjusts to correct English.

Writing Skills

Online technological tools meant for improving writing skills also hone the skills of students and teachers in other areas, such as organising their written work, checking for grammatical mistakes, and providing corrections. Through technological innovations, the writing skills of teachers and students are widely improved with tools such as the Readability Test Tool, which helps to organise the written text in a form that is easy to understand. To correct repetitions and redundancies in writing, students and teachers can rely on Word-counter. To ensure that the written work is unique for grading purposes, students can use online plagiarism checkers.

Reading Skills

Through the Rewordify website, students can type, copy, and paste sentences with phrases that are complex to read. The website then provides straightforward suggestions to replace problematic words. The website also has text-to-speech functionality that helps students read the original text, assisting them in learning new vocabulary. Other tools for reading comprehension are the Google Chrome extensions like Snap and Read Universal, which is like Rewordify. Additional reading technological tools include Newsela and Immersion reading, among others.

Educational Technology for Improving Preservice Teachers' Pedagogical Skills

Many teachers face the challenge of adapting to the current tech-savvy generation of teachers who can process digital information more efficiently than their predecessors (Bolton et al., 2013; Venter, 2016). It is observed that educational systems worldwide are adjusting to technological challenges and pedagogical innovations to keep pace with 21st-century technical learning. Twenty-first-century teachers are expected to shift to a more constructivist and learner-focused approach and resist the traditional teacher-centred process. Such a shift is possible with pedagogical innovation and appropriate technology. The transition to a learner-centred teaching approach allows the transfer of knowledge through meaningful methods with experiences that empower students to learn and comprehend independently.

Pedagogical innovation primarily focuses on Web 2.0, which is recommended by researchers to be integrated by teachers into the teaching and learning process. Web 2.0 technology provides students with the opportunity to become innovators and owners of content and knowledge on the Web (Roussinos & Siorenta, 2013; Sailin & Mamor, 2017). Therefore, the Web enhances meaningful learning by enabling collaborative environments, including wikis and blogs. Teachers must have some knowledge and experience to integrate Web 2.0 into their teaching practice effectively. A study conducted to determine teachers' interests and their perception of Web 2.0 found that they have a positive attitude toward integrating with Web 2.0 (Yuen et al., 2011). However, they also expressed concerns about a lack of experience using Web 2.0 tools in the classroom teaching and learning process.

To successfully incorporate educational technology in learning, teachers must have belief, knowledge, and confidence in using a particular technology. These are the factors to consider for successfully integrating educational technology, such as Web 2.0 technology (Ertmer & Otenbreit-Leftwich, 2010). Teachers need to learn with Web 2.0 to familiarise themselves with the technology, develop authentic practical experience, and gain knowledge on the planning and implementing the learning process while using this technology. Though technological knowledge is necessary, it may not be helpful if teachers have no confidence in utilising the tools available to facilitate students' learning (Ertmer & Otenbreit-Leftwich, 2010). Therefore, teachers need to understand digital pedagogy and Web 2.0 and exhibit confidence in its effectiveness if integrated into teaching and learning activities.

Teachers need to be skilled enough to facilitate meaningful learning, which is gauged when students are active, cooperative, intentional, and constructive. This can be achieved by using technology to work on authentic tasks (Howland et al., 2012). Web 2.0 offers various functions that facilitate meaningful learning, and it is thus an essential tool for achieving the objective of constructive education (Jimoyiannis et al., 2013). For example, it contains social networking operations, blogs, and wikis, enabling active participation and learning engagement. In addition to obtaining knowledge, students can use Web 2.0 technologies to actively create and share information with others (Leh et al., 2012; Baltaci-Goktalay & Ozidilek, 2010).

Polin and Light (2010) emphasise the integration of Web 2.0 technologies in teaching and learning and state that it is ideal for supporting meaningful and active learning, as it enables collaboration and interaction. The technology delivers an authentic learning experience through education by action, experimentation, and interaction (Sailin & Mahmor, 2017). Scaffolding, a crucial process for promoting higher-order thinking skills, is made possible by integrating Web 2.0 technology in learning (McLoughlin & Lee, 2010). Web 2.0 eliminates the learning process where students are simply passive receivers of knowledge and information from teachers. It upgrades the learning process by enhancing students' creativity and writing skills to a level where they can create their knowledge. This is possible through more customised learning environments.

Applications supported by Web 2.0, such as blogs, enable learners to exercise their thinking and writing skills to examine and understand issues through collaborative writing. A study conducted in 2012 established that the use of blogs in knowledge creation improves students' technological and writing skills (Leh et al., 2012). The research also identified an increased motivation among learners to submit their homework while using blogs. The students explained that the inspiration was due to the opportunity to have complete ownership and control of their assignment presentations. Therefore, teachers need to intensify Web 2.0 applications to improve learner collaboration, interaction, and communication.

Teachers' use of educational technology enhances success in their work because of various attributes associated with technological tools. First, the teacher's technical diversity enables an active learning process. This implies that students will no longer be passive listeners. It offers avenues where learners navigate on their own to achieve knowledge and understanding. They reflect and take account of their personal experiences with the activities observed and undertaken. Third, educational

technology teaching methods enable students to shift from traditional memorisation of abstract ideas and concepts to a different understanding of authentic tasks and real-time problem-solving. The new teaching and learning process involves teachers guiding students through intentional learning, giving them a feeling of emancipated learning. They can set learning goals and plan the achievement of those goals. The final attribute is that the teaching-learning process enables a cooperative environment between students, shifting from a competitive environment to a collaborative one. Students can work as a team to solve tasks through collaborative discussions, improving their understanding, and applying their knowledge.

Teachers can capture learners' attention and concentration using technological skills to create classroom presentations, such as using animations in PowerPoint presentations. Students are most likely to be active when teaching involves audio-visual graphics. Most textbooks contain uninteresting topics that contribute to learners' boredom; teachers can eliminate or reduce this by using technology to engage learners with the latest learning techniques. Teachers become more successful in their teaching through the use of educational tools. They can also activate high levels of interpersonal skills among students. They can reach the students wherever they are at different times and interact with them outside the school environment.

Teachers can use technological resources to make their teaching roles more efficient by using digital portfolios, electronic grade books, real-time feedback, and learning games. Through technology, teachers can perform virtual learning/teaching effectively by demonstrating abstract ideas. For instance, using technology, a teacher based in Bangkok, Thailand, will be better positioned to teach their students about many states in the United States of America. The teacher can use video conferencing to conduct a virtual chat with a class in Switzerland. Such an experience would be more effective and interesting than if the teacher relied solely on the book's photographs and descriptions of the country, which some students may also not understand. The teacher can also contact officials in Switzerland who may agree to use virtual technology to take

the learners through a virtual tour of the country's museums and landmarks.

In earlier days, teachers used storytelling and jokes to entertain their classes and reduce boredom. However, some students may not relate to such stories and jokes and may find the process even more tedious. With technology, teachers can create liveliness using something that most learners can identify with. For example, teachers can use video games to ease the boredom of sitting in a classroom for hours. The use of gaming in schools was supported by Bediou, et al.'s (2018) study, which states that between 10 and 30 hours of gaming per week in school can improve learners' multitasking ability and spatial cognition. An example is the use of animated cartoon monsters by teachers to facilitate the learning of numbers and vocabulary for kindergarteners. This will enhance their learning of primary phonics more, in comparison to the use of vocabulary worksheets.

Through the availability of technological communication tools, teachers can connect to millions of fellow teachers worldwide and, therefore, share ideas and experiences. The teacher can learn new teaching styles and approaches to handle students, as they all share their different experiences with students. Through technology, digital simulations and models are used by teachers to expose students to the real world. Students can apply concepts and test theories before integrating them into the real world. These experiences are usually more accurate than just waiting to use the learning process later in one's life. Such testing of learning concepts improves the memory and retention capacity of learners.

Technology is an effective communication tool. Successful learning depends highly on the practical, timely, and relevant communication. Some teachers may be very knowledgeable but may lack good communication skills. Such teachers can make use of technological tools to clarify their communication through audio-visual technologies. Teachers need to research to be better equipped to share current knowledge and use explanatory techniques. In addition, they need to be knowledgeable enough to deal with challenging questions from students. The availability of technological tools, such as the Internet, has facilitated teachers' knowledge. Some

refer to it when faced with difficult questions from learners.

The availability of digital simulations enables teachers to make real assessments to evaluate the learner's practical understanding of concepts rather than testing the memorising power of the students. Through educational technology, teachers can have a more personalised relationship with learners who take more time to absorb a concept. Teachers can provide more electronic material to such students, allowing them to review them after school hours. Teachers can virtually administer more examinations to such students until they are at par with other learners.

Educational Technology for Improving Preservice Teachers' Technology Skills

Digital teaching and learning help preservice teachers improve their lesson plans and acquire and build essential 21st-century technological skills. Their job is made smoother, and they can achieve the same teaching goals with less mental effort and paperwork. The exposure to technology of students and teachers helps them apply it to other non-education concerns. They may use technology exposure in their future occupational specialisations. The integration of technology in learning equips them with the skills necessary to thrive in the 21st century. They develop creativity and innovation, collaboration and team building, critical thinking and problem-solving, and effective communication, referred to as the "4Cs" of education.

These 4C skills are referred to as 21st-century skills by the European Union and the US, which firmly believe that educational technology is necessary to equip learners with these essential skills. Employers in the 21st century require tech-savvy candidates, and the exposure of the preservice teachers to digital learning is an added advantage in the job market. Employers are looking for candidates who have had real-world learning experiences. Such experiences can be traced to simulations, wikis, social media tools, games, and collaborations, offering students a chance to participate in a real-world learning environment.

The technology skills applied by both teachers and students can also be helpful outside the classroom

environment. For example, they may use technology to solve community problems by forming online community forums for discussion. Many university students have applied their learned scientific and technological skills to solve this challenge. In addition, students can use social networking platforms to learn from global happenings and solve local issues. Students and teachers have improved their experience with video and blogs and can share their research with experts worldwide while storing their work in online learning portfolios.

Educational technology in the teaching and learning process enables teachers and students to familiarise themselves with different technological applications. They get opportunities to understand the user interface and the application of artificial intelligence. Such knowledge is essential, as these applications are being used beyond classroom settings. The use of technology enables both students and teachers to develop analytical skills that can be used in their personal lives. Some students may develop career interests through educational technology in the teaching and learning process because of their deep interest and proficiency in some aspects. Some students may decide to major in computer science, blogging, and digital photography, among other computer-related careers and occupations.

The use of educational technology can improve orderliness in the personal lives of both teachers and students in aspects such as documentation, content organisation, progress record, etc. Both learners and teachers realise that they can minimise paperwork, which tends to take up space in offices and homes. Therefore, they can switch to electronic documentation. Teachers can apply the techniques learned to facilitate other tasks. They can decide to back up personal data in electronic, hard drives. Students can also opt for the electronic storage of study materials and lessons. The use of educational technology improves research and information literacy. Through the Internet and search engines, teachers and students can access a vast stream of data related to their research and interest areas. Research durations have been significantly reduced as the need to travel to collect data is now rendered optional. The analysis of research findings has improved

with the availability of sophisticated computer tools that process a large amount of data simultaneously. Through improved research, both students and learners can innovate easily.

Teachers have realised that their physical presence is not a prerequisite for learning because of remote learning provided by technology in education. Teachers can efficiently prepare their lessons and experience an overall dramatic improvement in their work quality. The new forms of assessment now include tests for practical skills. Students also do not have to be physically present to take their examinations. The marking time for completed tests has dramatically reduced, as some teachers can implement computer-programmed marking of student tests. Through technology, the overseeing of learning and tutoring are possible. In particular, technology learning skills have played an instrumental role in enabling education during this era of COVID-19. Most technological changes, such as remote learning, may become permanent features and regular means of imparting education in some institutions. Through technology, teachers can manage the ratio imbalance between the small number of available teachers and the greater number of students.

Conclusion

The world depends on technology and innovation in all aspects of life. Therefore, the educational field should adapt to the new technological reality. For meaningful and practical technical learning, academic training should start in teachers' training institutions to facilitate learning by the current tech-savvy generation. This study has also revealed the effectiveness of technology in learning English skills and of learning a language in general. The use of technology in learning equips learners with practical technological skills to solve contemporary technical problems. It is through technology that the educational processes will continue uninterrupted through unforeseen pandemics like COVID-19. The future of technology is bright, and the world is still to witness the most sophisticated and efficient software. Therefore, education should be ready to embrace educational technology and continue to undertake and sponsor research for more educational and technological inventions.

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