PHYSICAL SCIENCES

TECHNOLOGY IS TRANSFORMING THE EDUCATION SYETEM IN MODERN ERA

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Abstract
Technology is always intended to save time, boost efficiency, and make it easier to do certain physical or mechanical tasks. Almost all educational concerns, including school activities, have been mechanized by technology. True, why should a youngster or student learn the fundamentals of math when they can utilize a calculator on their phone? Or why should a youngster or student learn spelling, grammar, or writing style when autocorrection software is available? As a result of what began as a good purpose, future generations will be unable to accomplish basic cognitive tasks without the aid of technology. It is also true that when children or students rely on technology to handle every difficulty in education or at school/institute, they progressively lose their problem-solving talents, which are in high demand. Although digital or smart technologies have been shown to improve student advancement and project collaboration, many people ignore their biological need for real-time interaction, which is the only solution to such a peculiar problem. We have known for thousands of years that we have lived as social beings, and we now believe that we can simply fool our genetic propensity. Today, the quantity of explicit information available on the internet or online is astounding, and there are no age limitations, so children/students may easily access it. Furthermore, web access interferes with children's/students' physical activity, sleep, sociability, teacher-student connection, and so on. This is a research article that examines how technology is transforming the education system in this modern era along with benefits and drawbacks of technology in education in 21st century.

Keywords: EdTech, AI, IoT, robots, MOOC, LMS, Minecraft

Introduction

Learners of the 21st century differ significantly from those who existed prior to the advent of the Internet, online study, and digital learning. A more dynamic learning environment is produced by technology. As technology advances, classrooms are undergoing diverse redesigns and reinventions to cater to the growing demands of contemporary digital learners. Internet usage has developed into an indispensable information resource. The internet is replete with numerous student and children's publications that can aid a child in acquiring more information. It assists them in developing self-reliance as learners and gaining self-assurance. An additional benefit of the internet is that it provides children with an abundance of information that may inspire them to begin reading. The unbridled expression of children's imaginations is unforeseeable. These days, children have access to laptops, tablets, and a plethora of other technological devices that aid them in materializing their ideas. Although students still have access to traditional writing instruments such as pens and paper, they now have the ability to generate 3D animations rather than static images. They endeavor to create more intellectually and to experiment with novel concepts. It enhances their capacity for learning, thereby better preparing them for future endeavors. On the contrary, it is the most disconcerting consequence of unsupervised technology usage among children and students. Surprisingly much explicit information is accessible via the internet or online. Consequently, infants and students who have unsupervised access to technology will have significantly simpler access. The majority of websites that exhibit such content lack age restrictions, making them accessible to students and children without difficulty. In addition, naive juveniles can be easily duped by malicious online users into divulging sensitive financial and security data or inappropriate images; this is especially true if guardians have not adequately educated their children about fundamental online safety. Additionally, online access hinders the socialization, physical activity, sleep, and teacher-student interaction of children and students. This is an analysis of the impact of technology on education, including a comprehensive evaluation of the advantages and disadvantages for students or children.

Technological advancements are enabling substantial changes in educational content, delivery, and accessibility. New technologies have aided the exponential rise of human knowledge throughout history. The early twentieth century was focused on the use of radios in education.[1] But since then, people who come up with new ideas have seen technology as a way to make conversation, learning, and mastering schoolwork better. Big changes are being made possible by the next wave of education tools. Games, simulations, and virtual reality are some of the new tools that are being used in education.[2] Presently, an increasing number of software applications are establishing environments in which pupils can guide the development of

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[1] Reid, Seerley, and Daniel Day. "Radio and records in education." Review of Educational Research 12.3 (1942): 305-322, accessed on 13 Sep 2023

[2] West, Darrell M. Digital Schools: How Technology Can Transform Education. Brookings Institution Press, 2012

their own knowledge with minimal guidance from instructors. A potential benefit of digital technology is the potential for expense reductions. Over one million positions were lost in the education service sector throughout the Great Recession.[3] The reduction in education expenditures by state and municipal governments has consequential ramifications across the education system. In the present day, educators across various educational institutions ranging from colleges to elementary schools have a heightened challenge due to a scarcity of resources. Considering the prevailing political landscape characterized by austerity measures, the prospects of a prompt reinstatement of financing to pre-recessionary levels appear to be minimal. In the present scenario, the significance of educational technologies is heightened as they strive to support overwhelmed educators in implementing the forthcoming wave of assistive technology. Education encounters distinct resource challenges that extend beyond just budgetary constraints. The duration of the school day is limited, and the allocation of teaching time is highly valued. Students from developed nations such as the United States allocate a comparatively lesser amount of time within the confines of a classroom, in contrast to their counterparts in several other countries throughout the globe. Despite the fact that teenagers engage in interactions with their parents, instructors, and friends, there has been a notable increase in the prevalence of diagnosed depression among young individuals. Presently, this figure has escalated to almost 20%, which is a significant development. The sole recourse available to instructors and educational institutions is to promote and foster interpersonal engagement among students or young individuals. The potential oversight of the expenses associated with technology upgrades or maintenance is a common occurrence. In an era characterized by frequent advancements in digital technologies and the escalating demand for more robust equipment to accommodate software and application upgrades, placing exclusive reliance on the notion that technology is the sole remedy for educational challenges appears too certain. The discussion centers around the notion that teaching and learning may be conducted in the absence of technology. However, the key inquiry pertains to the long-term use of the learned specialized skills in a context characterized by technological regression over subsequent generations.[4] Therefore, educational institutions are obligated to estimate the actual long-term costs of that investment and how it will affect the tuition fees that students and their parents are required to pay in order to prevent regret regarding the purchase of new technology.

The acquisition of technical education and skills is of paramount importance in the development of human resources for any given nation. Education of this kind yields a proficient labor force, augments production, and contributes to the ame-

lioration of the overall quality of life for the populace. It is imperative to generate purposeful, qualified, and competent human resources in the contemporary period characterized by advancements in science and technology. Indeed, a strong correlation exists between the technical or vocational education system and the socio-economic growth of a nation. There is a lack of access to technical and vocational education among the younger generation and students from low-income, least developed, and developing nations. The observed metric exhibits a significant disparity and concerning trend when juxtaposed with other advanced and robust economies. There is a need to alter the mindset of parents and students in these nations, with an emphasis on prioritizing technical education above general education. This is the reason why a significant number of individuals with a general level of education experience unemployment on a global scale. Unemployed individuals provide a significant economic and social challenge for the nation and society. Unemployed teens often experience discontentment and may become involved in criminal activities and substance misuse. The global need for a proficient workforce is projected to experience a significant surge, including Middle Eastern nations. Presently, a substantial proportion of the labor force in these countries comprises individuals from impoverished, least developed, and emerging nations, who possess limited or moderate skill sets. This study employs an analytical approach, utilizing both primary and secondary sources, to evaluate how technology is transforming the education system in this modern era along with benefits and limitations of technology in education. Additionally, this study has included a diagnostic analysis to illustrate the essential requirements of technical education for the current generation.

Education Technology (EdTech) Tools and Its Impact

Using technology in the classroom doesn't have to mean using computers. There are many other ways to do it. As schools try to give their kids the best education possible, using technology in the classroom is becoming more appealing. The world of technology has changed a lot in the past few years. As more and more people get into digital media, it is important for teachers to use the newest tools in their work to keep students interested. For students to be interested in learning, it needs to be new and creative. Students should be excited about what they are learning. Because it is so important in today's education business, teachers have to know how to use educational technology.[5] Technological advancements have had an influence on every aspect of life throughout the years. Technology has permeated every aspect of our lives as it has become more accessible, and as a result, we now demand all products

[3] Haver Analytics. "Employment Household Survey" Employment: Education Services January 1983 to January 2013, accessed on 13 Sep 2023

[4] https://www.allisonacademy.com/students/self-improvement/importance-of-soft-skills-for-students/, accessed on 29 Jul 2023

[5] https://elearningindustry.com/how-important-is-technology-in-todays-education-industry, accessed on 24 Jul 2023

or tools that we use to be as technologically sophisticated as possible. Schools have also embraced technology as an essential component of their educational process, and as a result, they now offer computer science programs in which students learn how to code computers and utilize them for their work or projects. The usage of educational technology has therefore become vital for today's learners and students since it allows them to study at a much faster rate than they would if such tools and programs were not used.[6] Schools or teachers which have adopted or replaced traditional classroom tools with equivalent technology tools known as EdTech tools and that has been given below.

a. Whiteboard Tools. The whiteboard was very common since long and which is going to replace by equivalent technology tool. Now, several whiteboard equivalent technology tools are providing the same experience like whiteboard.

➢ **Sketchlot**. This is free and works on most browsers and devices nowadays. It is intended for use by teachers and students. Using the tool requires teachers to create an account and then add a list of students. The teacher then assigns passwords to students. The passwords are used by students to join drawings shared by the teacher.[7] The teacher can choose who they share whiteboard content. Students can also create drawings and share with their teachers.

➢ **Aww**. It is another app that is also browser based. A US$ 10 monthly subscription is required to use the app. To use the app, go to awwapp.com and start drawing. One can invite people to see their whiteboard content by sending them the link of their drawing.[8]

➢ **Stoodle**. This is a free whiteboard tool. The tool is easy to start using. It is a free tool where users can join an online classroom by simply sharing an URL. It offers real time collaboration and communication; multiple users can work on the same virtual whiteboard at the same time through text chat and voice conferencing using their computer's microphone. They also can type, draw, and search and upload images.[9]

➢ **Draw It Live**. It is very much similar to Stoodle. Using Draw, It Live requires going to the website, click 'collaborative whiteboard' and giving it, a name and you are ready to go. Sharing the drawing is achieved by just inviting people by sending them the link given to your drawing. Draw It Live offers a free space for students to instantly create a collaborative whiteboard to use with anyone they like. Student can invite people to draw with them by sending them the URL assigned to their whiteboard.[10]

➢ **FlockDraw**. It was an online community where users could start drawing on a whiteboard and invite others to collaborate. A group could have unlimited number of users who could draw in real-time. It also provided a live chat option.[11] Using FlockDraw requires visiting the website, click 'start drawing' button and you are ready to go. Sharing the drawing is by sending people the link of your drawing.

b. Presentation Tools. Several tools exist online that can be used for presentation. There are several online presentation tools are available now. Such as:

➢ **Prezi**. It is one of the best presentation programs available online. It is known for creating zooming presentations. To use Prezi, one requires signing up. A user is availed with many templates that they can use to create presentations. It gives the option of sharing the presentation URL or downloading then sharing. It allows for the addition of text, images, shapes, and other media.[12]

➢ **Glogster Edu**. It is a cloud-based (SaaS) platform for creating presentations and interactive learning. A platform that allows users, mostly students and educators to combine text, images, video, and audio to create an interactive, Web-based poster called glogs on a virtual canvas. Glogster facilitates the conveyance of social information in many different fields such as art, music, photography.[13] Users also have access to a library of engaging educational content posters created by other students and educators worldwide. Glogster enables interactive, collaborative education and digital literacy. It allows for the addition of text, images, shapes, and other media. When done creating a presentation, just save and share with other students.[14]

➢ **Animoto**. It is intended for presentations that seek to deliver animated experience. The presentations generated by this online presentation tool are video based. It involves picking a style and a song that will be used for creating a presentation. You can then add photos, videos, and text. The final step is producing and sharing the presentation. It offers many templates for selection.[15]

➢ **Kizoa**. It provides the ability to create animated presentations, slideshows, or video. It is a blend of several online presentation tools features. To create a presentation using Kizoa, create a slideshow, and then select pictures. It offers the ability to edit the images so that they can blend into the background. Next, one selects transitions, animations or music for the presentation. Finally, edit the text, save and share.[16]

➢ **Photo Peach**. It is for teachers to create media rich presentation. It has a range of options for inserting

[6] https://mashable.com/archive/technology-in-education#Zl_DkQEpyqq0, accessed on 13 Sep 2023

[7] https://edshelf.com/tool/sketchlot/, accessed on 09 Sep 2023

[8] https://www.oxfordlearnersdictionaries.com/definition/english/aww, accessed on 09 Sep 2023

[9] https://blogs.umass.edu/onlinetools/community-centered-tools/stoodle/, accessed on 09 Sep 2023

[10] https://freetech4teach.teachermade.com/2011/09/draw-it-live-simple-free-collaborative/, accessed on 09 Sep 2023

[11] https://tracxn.com/d/companies/flockdraw/__cost-7Zi4WLgFLxxsbqMytz76393gJjjHhx96yW2TC8, accessed on 09 Sep 2023

[12] https://prezi.com/, accessed on 09 Sep 2023

[13] Awada Ghada M et al, (2015-10-05), "Effect of Using the Glogster Technological Model on Enhancing the Perceptions and Speaking Proficiency of Communication Skills Students". International Journal of Global Education. 4 (2). ISSN 2146-9296

[14] Sharon Martinez Alba et al, (2014), "Glogsters and Other Motivating Technology: A Multiple Case Study of English Learners", Reading Matrix: An International Online Journal, 14 (2), ISSN 1533-242X

[15] https://animoto.com/, accessed on 09 Sep 2023

[16] https://www.kizoa.com/, accessed on 09 Sep 2023

media, which make the presentation unique and creative. Allows or addition of background music or audio to suit a presentation.[17]

➢ **Channel Me.** This web tool allows a group of users to view the same content at the same time and chat with each other.[18]

➢ **Search Team.** It allows for small sized team to search together to achieve the best results.[19]

➢ **Mind42.** It is a web-based application that enables a group of users to mind map their ideas. It keeps track of the ideas.[20]

➢ **Entri.** It is a free group tool for writing and sharing documents. It is intending for sharing documents with a group of users to get the feedback before releasing the final document.[21]

c. Course Assessment Tools. Uses of technology in education are increasing with advancement in technology. Many people are now using the online education platforms to get educated. Some of the course assessment tools used frequently in online learning have been given below.

➢ **ClassMaker.** This online assessment tool is secure and web-based. It is easy to use and customize. It is intended for assessing tests and quizzes and provides instant grading.[22]

➢ **ClassTools.** Used to create quizzes, games, activities and diagrams. It is a free tool.[23]

➢ **Easy Test Maker.** A free online tool used to create tests. It has options for creating multiple choice tests, matching, and short answer questions.[24]

➢ **Hot Potatoes.** It allows for creation of interactive quizzes as crossword, gap-fill, ordering, and multiple choices.[25]

➢ **Quiz Revolution.** It used to create interactive quizzes for Facebook and online quizzes for embedding on websites.[26]

Figure 1: EdTech and modern classroom Tablets and Chromebooks is educational tools

d. Library Tools. Adoption of eLearning is forcing education institutions to offer library services online. Besides, there are free online libraries providing e-library services. Examples of such online tools are as follows.

➢ **Free Book Spot.** This online free eBook source with over 4400 free downloadable eBooks.[27]

➢ **4eBooks.** It has a huge collection of computer programming eBooks each downloadable.[28]

➢ **Free-eBooks.** It is an online source that allows users to download free eBooks.[29]

➢ **Many Books.** It provides free downloadable eBooks for iPod and eBook reader.[30]

➢ **Get Free E-Books.** It is an online free eBooks source with over 4400 free downloadable eBooks.[31]

Massive Open Online Course (MOOC)

The term 'Massive Open Online Course' was initially introduced in 2008 by George Siemens and Stephen Downes. They facilitated what was arguably the first MOOC in that year. They provided a complimentary course titled "Connectivism and Connective Knowledge" in collaboration with the University of Manitoba's Extended Education and Learning Technologies Centre. The course was attended by more than 2,300 individuals and utilized an RSS aggregator to facilitate discussions.[32] The word MOOC has evolved to refer to two distinct online venues. The approach to teaching that connectivist MOOCs take sets them apart. The MOOCs described in this article are defined by their association with institutions, financial supporters, and income generation possibilities. MOOCs have the

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[17] https://www.pixtastock.com/c19/c6/c5/photo, accessed on 09 Sep 2023

[18] https://channel.me/, accessed on 14 Sep 2023

[19] https://searchteam.eu/, accessed on 14 Sep 2023

[20] https://mind42.com/, accessed on 14 Sep 2023

[21] https://entri.app/, accessed on 14 Sep 2023

[22] https://www.classmarker.com/, accessed on 14 Sep 2023

[23] https://www.facebook.com/Classtools/, accessed on 14 Sep 2023

[24] https://www.easytestmaker.com/, accessed on 14 Sep 2023

[25] https://hotpot.uvic.ca/, accessed on 14 Sep 2023

[26] https://study.com/learn/revolutions-quizzes.html, accessed on 14 Sep 2023,

[27] https://freebookspot.club/, accessed on 14 Sep 2023

[28] http://links.giveawayoftheday.com/4ebooks.org, accessed on 14 Sep 2023

[29] https://www.free-ebooks.net/, accessed on 14 Sep 2023

[30] https://manybooks.net/, accessed on 14 Sep 2023

[31] https://www.getfreeebooks.com/, accessed on 14 Sep 2023

[32] https://news.mit.edu/topic/massive-open-online-courses-moocs, accessed on 29 Jul 2023

ability to transform higher education by boosting student outcomes and broadening learning options. Tuition has grown dramatically in recent decades, and the accompanying cuts have harmed students and limited access for lower-income students. MOOCs have the potential to significantly reduce university expenditures while also providing courses to students all around the world.33 The most prominent MOOCs are Udacity, Coursera, and Edx. MOOCs recently took a big step forward when the American Council on Education (ACE) recommended 5 Coursera classes for accreditation. ACE membership consists of more than 1,800 universities.34 Because of the suggestion, recognized colleges may soon be able to use Coursera points to help students finish their degrees. With a web camera, Coursera might charge a fee to make sure a student is who they say they are and to oversee a final test. ACE is currently working on a more thorough review of MOOCs, but the suggestion shows how big the changes that are coming will be.35 Several colleges currently give students who finish MOOCs credit. The University of Washington (UW) was the first to offer MOOC classes. Through the Coursera platform, UW provides classes in applied mathematics, computer science, computational finance, and information security and risk management.36 UW had previously offered certification programs through online classes and is now in the process of reformatting them for Coursera.37 Additionally, San Jose State University (SJSU) and Udacity have partnered to provide college freshmen with an innovative remediation solution. At SJSU, fifty percent of undergraduates fail introductory courses in funda-

mental subjects. This causes bottlenecks in introductory courses and may result in students experiencing a postponement of their matriculation. SJSU provides credit-bearing courses in entry-level mathematics, college algebra, and rudimentary statistics via Udacity. The $150 fee for Udacity courses is significantly less than the expense of a traditional credit. By dividing its courses into brief videos and exams, Udacity enables students to complete the coursework at their own pace.38

MOOCs continue to march on to their disruptive journey in the field of higher education. President Obama had cited during the early years of MOOCs development that they had the potential to bring down costs of higher education, which remains a key concern among all stakeholders. MOOCs promise an alternate future to traditional education by keeping course material free but charging fees for assets such as certificates. Rising desire for cost-effective educa-tion, as well as an overloaded student population due to loan debt, continue to be important drivers of ex-pansion in the vast open online course industry. The market for MOOCs is projected to grow at a rate of 33.1% from 2021 to 2026. This is because people still want to learn, and more and more business train-ing programs are moving to online academies to meet this need. For example, IBM said that working with online schools for its business training led to huge im-provements in learning and cut costs by 30%, which saved the company more than $200 million. MOOCs have the potential to disrupt higher educa-tion, improving outcomes for students and expanding learning opportunities.

33 Martin, Fred G. "Will massive open online courses change how we teach?." Communications of the ACM 55.8 (2012): 26-28, accessed on 13 Sep 2023

34 "About the American Council on Education," 2013,Web: http://www.acenet.edu/about-ace/Pages/default.aspx, accessed on 13 Sep 2023

35 Kolowich Steve, "American Council on Education Recommends 5 MOOCs for Credit." The Chronicle of Higher Education 7 February 2013. Web. http://chronicle.com/article/American-Council-on-Education/137155/, accessed on 29 Jul 2023

36 "University of Washington Is First in U.S. to Provide Credit Classes and Certificate Programs on MOOC Platform." 18

July 2012. Web. http://www.pce.uw.edu/news-room.aspx?id=10865, accessed on 29 Jul 2023

37 Long Katherine, "UW to offer fee-based courses through Coursera." Seattle Times 18 July 2012. Web. http:// seattletimes.com/html/local-news/2018714077_coursera19m.html, accessed on 29 Jul 2023

38 Das Sumi, "Udacity, San Jose State University offer online classes for credit." 29 January 2013, Web: http://news.cnet.com/8301-1023_3-57566552-93/udacity-san-jose-state-university-offer-online-classes-for-credit, accessed on 29 Jul 2023

Figure 2: Success of MOOC39 and massive market growth of MOOC40

The University of Wisconsin-La Crosse developed a math MOOC. Using a $50,000 grant from the Bill and Melinda Gates Foundation, UW La Crosse developed the open math course.[41] UW La Crosse intended for the course to help high school students, those seeking remediation inside the University system, those planning to re-enter a university, and those prepared to take a major gateway test. The content is similar to that of the on-campus program MTH 051 Intermediate Algebra.[42] This is something that a lot of other colleges want to do as well. Three main things all MOOCs have in common. The first is that it can be scaled almost infinitely. A single Coursera class had tens of thousands of people sign up.[43] MOOCs also have an open accessibility. There is no requirement for prior experience or qualification to enroll in a course. Also, there are no costs associated with taking a MOOC. Future-looking MOOCs will necessitate a business model. Possible choices include requesting monetary compensation from students in the form of tuition, certification test fees, course sponsorships, or staff recruiting. Finally, the technology that is used in MOOCs is a defining factor. They typically use free or open-source software, such as that found on Wikipedia or the Google Play store. Unlike the conventional paradigm, in which a small number of students pay a large sum in tuition, the large number of participants in MOOCs makes it possible to use a model in which each student pays just a modest amount.[44] The main advantage of MOOCs over traditional institution models is the potential for cost savings. Universities are confronted with a number of cost-cutting problems. Improving productivity is challenging due to Baumol's Cost Disease. According to economic theory, pay increases are accompanied by increases in worker productivity. However, in domains such as education, productivity improvements have little noticeable impact on pupils. A poor professor can teach nearly the same number of students as a good professor, and both will have some outstanding pupils. Large lecture halls in academic institutions are expensive to maintain. MOOCs rely on low-cost open-source technology and can quickly scale. In an online context, the expenses of a million-student class are comparable to the costs of a hundred-student class. MOOCs might reduce the number of sections for popular beginning courses at universities, freeing up academics to teach other classes or do research.[45] The curricula of Udacity, Coursera, and Edx include retrieval exercises and intentional practice. In addition to facilitating constructivist learning, MOOCs employ formative assessments effectively. The pedagogical strategy of Coursera, which the company's founders Andrew Ng and Daphne Koller establish, is supported by research cited in their presentation on the platform. Effective teaching tools can be identified as "retrieval exercises" or active, cue-driven processes of knowledge reconstruction, according to the research of Jeffrey Karpicke and Janell Blunt. In determining whether retrieval or "elaborate learning" (i.e., conventional study methods) had a more significant effect on student proficiency, the authors conducted an investigation. One week after being instructed in the same lesson utilizing various techniques, the students were evaluated. A fifty percent enhancement in long-term retention scores was discovered as the benefit of retrieval practice in comparison to laborious studying with concept mapping. In an additional investigation, participants examined two distinct teachings. Students who utilized retrieval techniques to study

[39] https://www.facebook.com/MOOC.edu/, accessed on 29 Jul 2023

[40] https://www.openpr.com/news/2279673/massive-open-online-course-mooc-market-to-grow-at-33-1-cagr, accessed on 26 Jul 2023

[41] "University of Wisconsin-La Crosse to develop math MOOC to boost college readiness and success." 13 November 2012. Web. http://www.wisconsin.edu/news/2012/r121113.htm, accessed on 26 Jul 2023

[42] "College Readiness: University of Wisconsin System's Math MOOC." 2013. Web. http://www.uwlax.edu/mathmooc/ index.html, accessed on 26 Jul 2023

[43] Adams, Susan. "Is Coursera the Beginning of the End for Traditional Higher Education?" Forbes 17 July 2012. Web. http://www.forbes.com/sites/susanadams/2012/07/17/ is-coursera-the-beginning-of-the-end-for-traditional-higher-education/, accessed on 26 Jul 2023

[44] Rodriguez, C. Osvaldo. "MOOCs and the AI-Stanford like Courses: Two Successful and Distinct Course Formats for Massive Open Online Courses." Learning (2012), accessed on 13 Sep 2023

[45] Ruth, Stephen. "Can MOOC's and Existing E-Learning Efficiency Paradigms Help Reduce College Costs?." Available at SSRN 2086689 (2012), accessed on 13 Sep 2023

achieved notably higher scores on a short-answer examination.[46]

Ng and Koller recognize Louis Deslauriers, Ellen Schelew, and Carl Wieman's contributions. The authors performed a study using two portions of an introductory physics class. One classroom employed standard teaching techniques, whereas the other followed the ideas of 'deliberate practice.' Deliberate practice is a constructivist and formative assessment-based concept. They discovered that students in the experimental section were more likely to participate and attend class.[47] MOOCs provide everyone access to learning possibilities. The benefits of giving pupils access to a classroom are immeasurable. MOOCs provide academics a way to share their theories with a broad audience. Distinguished academics may share their knowledge with learners worldwide through MOOCs. The ability to communicate with an almost infinite number of individuals will hasten the dissemination of information. MOOCs are going to attract more attention as the expense of attending university goes up. A new age in higher education is about to begin, one in which institutions will have unmatched reach. Modern classroom technology may increase learning possibilities and democratize knowledge. Students of the future will have access to a wealth of information through platforms like Edx, Coursera, and Udacity.

Minecraft

The internet changed the way professors and students shared knowledge. It gave instructors access to teaching standards, lesson plans, and extra resources.

Despite the magnitude of the shift, instructional technology has remained stagnant. The Internet has aided but not altered traditional teaching strategies such as lecture, group work, individual reading, and slide presentation. New technologies have given instructors new ways to instruct their pupils. Minecraft, a computer game, is the first step in that approach. Minecraft is a dynamic game with practically limitless customization options. Minecraft is a popular "sandbox" computer game. It is unfinished, having no clear storyline or game play objectives. Players approach the game in the same manner as children do with Legos or bricks. Minecraft's gameplay is deceptively basic. On the surface, players gather materials and construct things with them. Minecraft creates unique and massive worlds for its players. A Minecraft world has a cubic volume of two hundred sixty-two quadrillion, one hundred forty-four trillion "blocks." A Minecraft world would have a larger surface area than Neptune if each block has one-meter-long sides.[48]Numerous characteristics of the computer-generated environments in Minecraft resemble those of Earth. In addition to forest, desert, plains, wetland, jungle, icy plains, taiga, mountain, and ocean, Minecraft features more than a dozen biomes. Although each biome experiences climate-specific weather, the Earth as a whole maintains a regular day-night cycle. The world simulates gravity and watersheds accurately.

Every entity in existence is composed of blocks, encompassing various materials such as wood, earth, and so forth.

Figure 3: Minecraft house idea and Minecraft legends

Minecraft is a popular "sandbox" computer game. It has no minerals, precious metals, water, or many other elements. Physics and chemistry are governed by fundamental principles. Players can collect natural resources to construct almost anything their mind can conceive. It is conceivable to construct working electrical circuits or coal-powered motors with the right resources. The game produces a fair representation of Earth, complete with abundant resources and natural laws.[49] Minecraft has several features that allow it to

serve as a teaching tool. The game has a modification or mod called MinecraftEdu. MinecraftEdu gives teachers the tools to conduct a lesson in a virtual world. The mod allows teachers to place text around the world and control the location of students.[50] A community of teachers and educators has grown to support teaching on the Minecraft platform. They have created a dedicated Minecraft teaching wiki including lesson plans

[46] Karpicke, Jeffrey D., and Janell R. Blunt. "Retrieval practice produces more learning than elaborative studying with concept mapping." Science 331.6018 (2011): 772-775, accessed on 13 Sep 2023

[47] Deslauriers, Louis, Ellen Schelew, and Carl Wieman. "Improved learning in a large-enrollment physics class." Science 332.6031 (2011): 862-864, accessed on 13 Sep 2023

[48] Hafer, TJ. "Minecraft Infograhic reveals total volume of one entire world." PC Gamer 6 February 2013 Web.

http://www.pcgamer.com/2013/02/06/minecraft-info-graphic-reveals-total-volume-of-one-entire-world/, accessed on 26 Jul 2023

[49] Short, Daniel. "Teaching scientific concepts using a virtual world—Minecraft." Teaching Science-the Journal of the Australian Science Teachers Association 58.3 (2012): 55, accessed on 13 Sep 2023

[50] MinecraftEDu." 2012 Web. http://minecraftedu.com/mod.php, accessed on 26 Jul 2023

and research.[51] Minecraft has a lot of promise as a way to teach. In social studies, students could build their own pyramid and face the same technical problems the Egyptians did as they did the pyramid. Students could act out scenes from books. Biology, physics, and chemistry teachers could show how things work in real time. Students can use constructivism to learn with Minecraft. Constructivist theory says that when students interact with their surroundings, they learn reliable knowledge by exploring on their own. As an educational playground, the Minecraft models help kids learn in a real way. MinecraftEdu has a brand-new learning resource. Jeffrey Adams teaches science to middle schoolers at the Crescent School in Toronto. Adams used Minecraft to teach about designing for the long term. Students were told to make a model of a city that could last for a long time and use little energy. There were a lot of students who decided to build their models online in Minecraft. Every student got to build their own city and was given a job to play, such as a farmer, builder, or miner. Adams wanted to know if using Minecraft would make students more interested and improve their work. To do that, he gave a poll both before and after the unit. Eighty-six percent of the kids said they would like to play the game at school again. Eighty percent thought that games made them more artistic and let them do things they wouldn't have been able to do otherwise. In general, the kids liked how freeing Minecraft was.[52] Karen Yager and Andrew Weeding serve as educators at the esteemed Know Grammar School located in Sydney, Australia. Minecraft was employed as an instructional tool inside the classroom setting to facilitate the teaching of scientific concepts to a cohort of male students aged 12 to 13 years. The students were tasked with constructing a low-energy city model. The students were granted autonomy in selecting their preferred mode of presentation, with an overwhelming majority (96%) opting for the utilization of Minecraft. The participants were allotted a span of five days to construct their virtual urban centers, during which they were presented with daily tasks including the subjects of English, mathematics, science, and foreign language. This approach aimed to foster a multidisciplinary environment and maintain the students' concentration throughout the project. At the conclusion of the instructional day, the students proceeded to showcase their simulated urban landscapes. The researchers discovered that the male participants derived pleasure from the opportunity to engage in unstructured activities and undertake venturesome endeavors while operating within a framework of organization and guidance.[53]

Professor Jessica Bayliss used Minecraft as a teaching platform in her class Game Artificial Intelligence (AI) at the Rochester Institute of Technology. The students enrolled in the course were required to generate novel terrains and non-player characters, among several other assignments. College and graduate students have the opportunity to significantly alter the game. The game's source code is written in Java, a widely used programming language. Furthermore, the broad modding community offered a platform for creative expression and a source of assistance. In previous instances, Bayliss had employed alternative software platforms for instructional purposes; nonetheless, it was seen that pupils had a more favorable response when Minecraft was utilized.[54] Bayliss found that using Minecraft increased student motivation for artificial intelligence through modding. She observes that a greater number of students are being requested to perform AI-related independent studies than in previous years. Students were free to use the Minecraft platform as well as their own imaginations. Minecraft succeeds as a game and as an instructive tool for the same reasons. It is based on a background that everyone is familiar with, such as natural laws. By keeping the game basic, participants may engage in actual learning. The constructivist foundation allows people of all ability levels, from elementary school to graduate students, to learn from the game. Teachers will benefit from innovative instructional technologies in this dynamic classroom. Learning possibilities will only grow as MinecraftEdu improves. 'Artemis: Rocket Build' is an example of MinecraftEdu, and it is a blast off to the moon with this superstellar terrain made in collaboration with NASA. Students may interact with scientists and engineers, learn about jet propulsion, and create a rocket.[55] They can test their creation with a fiery launch. So, students are learning from playing games and own creation. Artemis: Rocket Build has the following learning objectives[56]:

➢ To learn about the Artemis program and its significance

➢ To use Newton's laws to understand how forces work and how these laws impact rockets' ability to fly.

➢ To learn about the parts of the Space Launch System and how propulsion and fuels are important to get the rocket off the ground and into space

➢ To better understand the Artemis missions (past, present, and future)

➢ To apply knowledge of Newton's Laws and a pre-set budget to assemble, design, paint, and launch a satellite, cargo rocket, and crewed rocket.

[51] "MinecraftEDu Wiki."2012 Web. http://mine-craftedu.com/wiki/index.php?title=Main_Page, accessed on 26 Jul 2023
[52] Adam, Jeffrey "Teaching Boys at the Coal Face: Mining Keep Pedagogical Approaches." Action Research Report (2012), accessed on 13 Sep 2023
[53] Yager, Karen and Weedings, Andrew. "Teaching Boys at the Coal Face: Mining Keep Pedagogical Approaches." Action Research Report Approaches (2012), accessed on 13 Sep 2023

[54] Bayliss, Jessica D. "Teaching game AI through Minecraft mods." Games Innovation Conference (IGIC), 2012 IEEE International. IEEE, 2012, accessed on 13 Sep 2023
[55] https://education.minecraft.net/en-us/lessons/artemis-rocket-build, accessed on 26 Jul 2023
[56] https://www.youtube.com/watch?v=mG5xUN3oiKk, accessed on 26 Jul 2023

An additional illustration of MinecraftEdu is 'Peace Builders'. Additionally, it offers fresh insights from four additional laureates and emphasizes conflict avoidance and resolution. A broader understanding of how to collaborate toward a more peaceful world will be imparted to the class.[57] Peace Builders was created as a creative and engaging introduction on how to build a better society. This experience will offer you with abilities that you may utilize to actively and successfully engage in society. It provides more possibilities to relive and learn more about the Nobel Peace Laureates and the improvements they brought about in the globe, therefore creating powerful and effective role models for society.[58] So, Those games or MinecraftEdu can test student's creation with a fiery launch. So, students are learning from playing games and own creation.

Learning Management System or LMS

2023 will be a big year for schools, businesses, and donors, with a focus on how to use data to make decisions. Schools will be smarter buyers, putting more weight on proof of effect from EdTech companies and using data to make smart choices about what to buy. More money will also be put into education study and testing how well edtech works. This trend is supported by both government spending and leaders in philanthropy. Companies that put study and proof at the center of their product development plans are more likely to make better goods that fit the market faster. Evidence-based approaches in EdTech should generally lead to better ways to boost student achievement and results. But only time will tell. That being said, we'll keep working on co-designing the future of EdTech for now.[59] EducateMe LMS is an excellent choice for operating bootcamps since it has an easy-to-use interface for creating and managing courses, classes, and bootcamp content. EducateMe enables bootcamp course designers to easily construct customized curriculums with varied lessons in a single site. Instructors may quickly upload lesson notes, offer homework projects via quizzes and exams, deliver live lectures, and track each student's progress. Everyone has heard of a Learning Management System, or LMS. Learning is at the heart of any educational or training program delivered by an individual. Management is the branch of the learning program that controls all of the schedules for each participant. The system is just an e-platform for delivering learning modules.[60]

LMS is designed to help an individual to develop, manage and provide online courses and programs to learn.[61] Additionally, it gives students and teachers a place to learn and show off their skills whenever and wherever they choose. Learning Management Systems (LMS) are programs that are used to run, keep track of, report on, and offer learning programs. LMS is used by almost all of the big markets, including schools, businesses, the medical field, and more. Checking each person's work on quizzes and tests can help you figure out where the communication gap is between the teacher and the student. With video lessons, stories, and features like games, etc., learning online is more fun.[62] Every individual on the planet's learning viewpoint has been altered by LMS. It has expanded the options for people to study and learn in whichever sector they desire to succeed in, as all material can now be shared globally. Nowadays, practically all corporations and organizations, all educational institutions (schools and universities), many government agencies, and private tuition and institutes utilize LMS. LMS addresses all of the primary learning challenges that each individual face, as listed below.

Employee training is available in any field, whether it be software, educational, corporate, or government. We need to teach staff according to our demands, which LMS can simply achieve. It automates the majority of the tasks. Tracks people' development, saving employers a significant amount of time and money. We may construct learning programs, courses, and tutorials in LMS and publish them so that anybody can use them to improve their skill set. These are useful when an employee leaves the organization or retires to ensure that the expertise is preserved. We may educate the general population by developing awareness initiatives and tutorials on a variety of topics. LMS is an open platform for individuals and professionals to learn and demonstrate their talents. Students can choose learning programs, and experts can teach learning courses. It gives its users the freedom to learn from anywhere. On a public note, it shares discussion forums. Users may simply study the topic of their choice, and the fee is relatively low in comparison.

LMSs give an all-in-one platform for learning and skill development. It offers a plethora of online courses from which the customer may select according to their preferences. It aids in the tracking of an individual's development progress. It minimizes the expense of learning as well as travel and space preparations. LMS helps to streamline the learning pattern, which saves time for teachers, allowing them to focus more on each individual's progress. Everything becomes digital, which saves a lot of money on notebooks, copies, and so on. It allows the user to study from anyplace and hence promotes mobility. Learning gets more exciting as things become more digital, thanks to the availability of video lessons, clips, gamification, and so on. With LMS, simple and effective administration is feasible, and information access is rapid and accurate. Although LMS has many advantages, it also has several drawbacks. The most significant disadvantage of online learning is that many tasks that must be completed physically cannot

[57] https://education.minecraft.net/en-us/lessons/peace-builders, accessed on 26 Jul 2023

[58] https://www.youtube.com/watch?v=t-QIJlW5OnM, accessed on 26 Jul 2023

[59] https://www.leanlabeducation.org/blog/edtech-research-predictions?, accessed on 13 Sep 2023

[60] https://www.softwaretestinghelp.com/learning-management-system/, accessed on 13 Sep 2023

[61] https://www.softwaretestinghelp.com/best-online-course-platforms/, accessed on 11 Sep 2023

[62] Robson K., et al, (2015), "Is it all a game? Understanding the principles of gamification", Business Horizons, 58 (4): 411–420. doi:10.1016/j.bushor.2015.03.006, accessed on 11 Sep 2023

be completed. Because no gathering is necessary for learning, the impact of face-to-face connection is diminished. It enhances the tunnel effect of learning, which reduces the breadth of broad thinking and causes the user to only see through the LMS, leaving numerous chances outside. Some pupils require motivation and encouragement to study, which will be lacking, resulting in credibility concerns.

Robot Assisted Language Learning (RALL)

One of the goals of Human–Robot Interaction (HRI) is to research and develop autonomous social robots as tutors that are able to support children learning new skills effectively through repeated interactions. To achieve this, the interactions between child and robot should be pleasant, challenging, and pedagogically sound.[63] Interactions must be enjoyable for children, demanding so that they remain motivated to master new abilities, and pedagogically sound so that children get information that maximizes their learning gain. Second language (L2) teaching is one arena in which robots for learning are being developed. While great work has been achieved in this sector, no effective one-on-one L2 tutoring program has been developed that can be systematically implemented in educational settings for multiple linguistic groups.[64] More attention is being paid to how social robots might help kids stay interested in learning tasks. Researchers have found that robots help kids connect with each other more in bigger classrooms, which leads to better language learning.[65] How best to apply this knowledge in the teaching of a foreign language has been explored by different researchers from various perspectives. Alemi et al. employed a social robot as an assistant to a teacher over a 5-week period to teach English vocabulary to Iranian students.[66] They found that the class with the robot assistant learned significantly more than that with just the human teacher. In addition, the robot-assisted group showed improved retention of the acquired vocabulary. This builds on earlier findings by[67] where a 2-week study with a robot situated in the classroom revealed a positive relation between interacting with a robot and vocabulary acquisition. Further results by[68] also confirm

that the presence of a robot leads to a significant increase in acquired vocabulary. Movellan et al. selected 10 words to be taught by a robot, which was left in the children's classroom for 12 days.[69] Children demonstrated a considerable increase in the quantity of learnt words when taught by the robot at the end of the research. Lee et al. further shown that robot tutoring may increase not just vocabulary but also speaking abilities. Children would begin their studies with a computer-delivered instruction, followed by pronunciation training with a robot.[70] The robot would detect words with an expanded lexicon based on commonly confused phonemes and correct the child's pronunciation. Additionally, the children's confidence in learning English was improved.[71] All of these studies show the capacity of various robots as tutors for children (with the children's age ranging from 3 to 12 years old) learning an L1 or L2 'in the wild'.[72] While the benefits of social robots in tutoring are clear, there are still a range of open issues on how robot tutors can be effectively deployed in educational settings.[73]

Historically, education institutions have been hampered by a shortage of qualified second language teachers. However, new technologies have the potential to transform the way pupils learn new languages. Learning a new language involves a lot of practice and memory. Language grammar and vocabulary give a specified framework. These circumstances enable robots to give outstanding assistance in secondary language acquisition. Researchers from the Korean Institute of Science and Technology's Center for Intelligent Robotics (CIR) and Pohang University of Science and Technology (POSTECH) created two robots to act as English teaching assistants. They developed two distinct models, MERO and Engkey. Engkey is an abbreviation for English Disc Jockey and resembles a large penguin.[74] Some Engkey models have faces that are meant to look like they are feeling different moods. Some have a screen that lets teachers use a phone to talk to students in another room. It is hard to find skilled English teachers to work on islands or in rural places in

[63] Tanaka F, Matsuzoe S (2012) Children teach a care-receiving robot to promote their learning: field experiments in a classroom for vocabulary learning. J Hum Robot Interact 1(1):78–95, accessed on 13 Sep 2023

[64] Käser T, Klingler S, Schwing AG, Gross M (2014) Beyond knowledge tracing: modeling skill topologies with bayesian networks. In: Proceedings of the 12th international conference on intelligent tutoring systems. Springer, Berlin, accessed on 13 Sep 2023

[65] Fridin M (2014b) Storytelling by a kindergarten social assistive robot: a tool for constructive learning in preschool education. Comput Educ 70:53–64, accessed on 13 Sep 2023

[66] Alemi M, Meghdari A, Ghazisaedy M (2014) Employing humanoid robots for teaching english language in Iranian Junior High-Schools. Int J Hum Robot 11(3). https://doi.org/10.1142/S0219843614500224, accessed on 13 Sep 2023

[67] Kanda T, Hirano T, Eaton D, Ishiguro H (2004) Interactive robots as social partners and peer tutors for children: a field trial. J Hum Comput Interact 19(1):61–84, accessed on 13 Sep 2023

[68] Tanaka F, Matsuzoe S (2012) Children teach a care-receiving robot to promote their learning: field experiments in a

classroom for vocabulary learning. J Hum Robot Interact 1(1):78–95, accessed on 13 Sep 2023

[69] Movellan JR, Eckhardt M, Virnes M, Rodriguez A (2009) Sociable robot improves toddler vocabulary skills. In: Proceedings of the 4th ACM/IEEE international conference on human–robot interaction, accessed on 13 Sep 2023

[70] Lee S, Noh H, Lee J, Lee K, Lee GG, Sagong S, Kim M (2011) On the effectiveness of robot-assisted language learning. ReCALL 23(01):25–58, accessed on 13 Sep 2023

[71] Saerbeck M, Schut T, Bartneck C, Janse MD (2010) Expressive robots in education: varying the degree of social supportive behavior of a robotic tutor. In: Proceedings of the SIGCHI conference on human factors in computing systems, ACM, accessed on 13 Sep 2023

[72] Vogt P, de Haas M, de Jong C, Baxter P, Krahmer E (2017) Child-robot interactions for second language tutoring to preschool children. Frontiers in Human Neuroscience 11, accessed on 13 Sep 2023

[73] https://link.springer.com/article/10.1007/s12369-018-0467-6, accessed on 29 Jul 2023

[74] Sang-Hun, Choe. "Teaching Machine Stick to Script in South Korea" Time 10 July 2010: n. page. Web. 15. February 2012, accessed on 13 Sep 2023

South Korea, as it is in many developing countries. Teleconferencing makes it possible for classes that are in different places to work together. Engkey can move around the classroom and talk to kids because he has "stereo vision." [75] MERO meanwhile is a "head only" robot. It looks closer to popular depictions of a robot with large eyes and colorful exaggerated features. The head is able to rotate on a plastic base. The robots look friendly and non-threatening to children. In 2010 Engkey cost about $8,700, but the Korean government hopes to bring that price down as production increases.[76] The Korean Education Ministry hopes to establish an English language robot in each of the country's 8,400 kindergartens by the end of 2013.

MERO and Engkey communicate using powerful voice recognition software. The robots employ transcribed Korean children's speech and audio recordings from the Wall Street Journal. The system contains noises that Koreans are prone to misidentify as the right phoneme. To account for unforeseen errors, the system may deduce what the speaker intended to say statistically based on the type of the error and the context of the phrase. The algorithm develops and scores a number of hypotheses regarding the speaker's intended word choice.[77] The ranking process lets the robots understand and improve the speech of young people who are learning a new language. One of the best things about the language recognition system is that it can find and fix mistakes made by speakers. Speech recognition software had a hard time in the beginning because speakers made mistakes that were hard for computers to understand. Every robot has a set of error rules that help it deal with mistakes that are likely to happen. One example is that the system stores all of the English vowel and consonant sounds (phonemes). MERO and Engkey use RavenClaw to keep track of their conversations.

Conversation trees at the Korean Institute of Science and Technology's Center for Intelligent Robotics enable robots to generate hierarchical maps. The electronic processor contains stop and turn-taking procedures that make discussions sound natural. The system contains several produced talks for students to practice with. Engkey may also use RavenClaw to correct English language learners' grammar, pronunciation, and vocabulary.[78] The system can tell what kind of mistake the person is making and give them tips on how to fix it. RavenClaw can look through an Example Expression Database, pick out a phrase that sounds most like what the speaker means, and then fix them. The system gives kids praise if they use correct grammar and have real talks. MERO and Engkey talk to kids through speech protocols and body movements as well. They have different faces that show different emotions, such as tolerance, dislike, hope, fear, joy, pain, surprise, shame, and sadness.[79] Engkey can also verbalize facial emotions and movements to wink, yawn, applaud, and pout. Conversations become more real as a result of the expressions. When the robots correct or laud a learner, they employ the appropriate social expression. Emotional expression is a crucial component of verbal communication because it adds context to talks. MERO and Engkey's creators investigated the efficacy of robot-assisted language learning (RALL). The study involved 21 pupils in grades two through six from a South Korean elementary school. Based on pre-test scores, they were divided into starting and intermediate groups. The pupils were all from South Korea and spoke Korean as their first language. None of the pupils had spent more than three months in an English-speaking nation. Lesson plans were created by the researchers for both the beginning and intermediate classes. The class focused on discussions suited for supermarket and stationery store buying. Students completed a post-test in addition to the pre-test to assess the cognitive impact of RALL on listening and speaking abilities. A 15-item multiple-choice exam was used to measure listening ability. They performed one-on-one interviews to demonstrate progress in speaking abilities. Ten tasks were included in the procedures to assess speaking abilities. The rubric graded pronunciation, vocabulary, grammar, and conversational competence on a five-point scale. According to the findings, RALL improves student speaking but not listening abilities. The post-test scores of the students were statistically considerably higher than the pre-test results. RALL had a substantial impact size on speaking abilities, ranging from 0.86 to 0.9 standard deviations. If the average student who benefited from the intervention began with ordinary skills, the results indicate that they would finish considerably above average, scoring higher than eight out of ten usual pupils.

[75] Lee, Sungjin, et al. "Cognitive effects of robot-assisted language learning on oral skills." INTERSPEECH 2010　Satellite Workshop on" Second Language Studies: Acquisition, Learning, Education and Technology. 2010, accessed on 13 Sep 2023

[76] Horn, Leslie. "South Korean Schools Testing Robot Teachers." PC Magazine 28 Dec. 2010: n. page. Web. 15.　February 2012, accessed on 13 Sep 2023

[77] Lee, Sungjin, et al. "Affective effects of speech-enabled robots for language learning." Spoken Language　Technology Workshop (SLT), 2010 IEEE. IEEE, 2010. B, accessed on 13 Sep 2023

[78]　http://billemmott.com/wp-content/uploads/2016/01/EducationBrookings.pdf, accessed on 29 Jul 2023

[79] http://www.cnn.com/2010/TECH/innovation/10/22/south.korea.robot.teachers/ index.html, accessed on 29 Jul 2023

Figure 4: Student practices her English pronunciation with a robot at South Korea's (MERO[80] and Engkey[81])

Most people who are learning English as a foreign language (EFL) don't have enough chances to say English. But the rise of social networking sites (SNSs) and mobile learning, especially mobile-assisted language learning, has given these English learners new ways to practice speaking English in a useful way.[82] A research conducted by the Center for Intelligent Robotics at the Korean Institute of Science and Technology found no statistically significant variations in listening abilities. Several variables, according to the academics who did the evaluation, may have impacted this finding. One hypothesis is that the text-to-voice components were insufficient to accurately simulate speech. Students who took part in prepared chats might have been reading the script rather than responding to the robot. It's also likely that the robots' non-human sound effects had a detrimental impact on understanding. Students said that they enjoyed their time in class using MERO and Engkey. KIST researchers devised a survey that students completed both before and after the intervention to assess student attitudes. The poll consisted of 52 items, with responses given on a 4-point Likert scale ranging from strongly disagrees to strongly agrees. Students who completed the program were far more likely to agree with the statement 'You are interested in English.' Student confidence grew during the curriculum as well. They were more likely to say, "You can greet foreigners with confidence" and "You believe you can speak English better if you study harder." Students indicated improved enthusiasm to learn English as well. They were more inclined to agree on the statements 'You wish to learn English more' and 'You spend more time learning English by yourself.' Overall, the students had a good experience with MERO and Engkey. The Secondary Language Acquisition (SLA) theory explains why RALL is effective in improving speaking abilities. According to SLA theory, four competencies are required to develop communication skills: intelligible input, comprehensible output, corrective feedback, and motivation. The RALL classes placed new terms in familiar contexts, which made learning easier. MERO and Engkey's corrective feedback and praise assist students build good speaking abilities. With context-supported teaching, RALL enables students to generate new constructs. In summary, RALL is a potent assistive technology with a proven impact. A shortage of trained secondary language instructors is expected to exist in the future, and teachers will require assistance in teaching the next generation of pupils. Students may engage in genuine dialogues with the help of robots. MERO and Engkey's performance in South Korea indicate how robots may improve student learning.

Figure 5: Advanced digital world and Social robots as second language tutors

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[80] http://edition.cnn.com/2010/TECH/innovation/10/22/south.korea.robot.teachers/index.html, accessed on 29 Jul 2023

[81] https://www.voanews.com/a/south-korean-students-learn-english-from-robot-teacher-117640783/167151.html, accessed on 13 Sep 2023

[82]   https://www.researchgate.net/publication/316061891_Improving_the_English-speaking_skills_of_young_learners_through_mobile_social_networking, accessed on 29 Jul 2023

Computerized Adaptive Testing (CAT)

Standardized tests haven't changed much in terms of technology in the last fifty years. Psychometricians have made some progress in writing items and making tests. But the paper-based test (PBT) with an electronic answer sheet has been around for a long time. Because it is more accurate and useful than standard test formats, computerized adaptive testing has the ability to shake up a field that has been stuck for a while. PBTs have a lot of problems. To be able to pass a PBT, you might need skills that don't directly show how well you know a subject. Someone with dyslexia might be very good at math, but they might have trouble reading test questions. A student who has trouble controlling their small motor skills might find it hard to fill in test boxes even though they may know a lot about the subject. It is easy to make mistakes and costs a lot to grade PBTs. Standardized tests are expensive because millions of paper tests have to be printed, stored, delivered, and picked up. It's very hard to organize everything needed to grade handwriting writings. To make matters worse, the PBT structure makes it easy to cheat. Cheating on standardized tests is a problem that hasn't been studied enough. But it seems likely that more cheating will happen as more people with a stake in education see their own financial futures depend on test grades. To get tests, schools have to spend a lot of money and time. These problems are built into the PBT system and are hard to fix.

Figure 6: CAT becoming successful testing[83] and benefit of CAT[84]

Computerized adaptive testing (CAT) is a testing method that dynamically adjusts to the unique skill level of each test taker. For instance, when a test taker responds accurately to a question in an examination, they will thereafter encounter a more challenging question. Alternatively, in the event that the individual answers the aforementioned question incorrectly, they will be provided with a less complex question. Put simply, the subsequent question is chosen solely based on the evaluation of the performance on the preceding question. Traditional or linear examinations classify problems into several levels of complexity. As an illustration, in the assessment of English language ability, the Common European Framework of Reference for Languages (CEFR) is employed, which has six distinct levels. In order to provide a more balanced assessment, it is advisable to allocate a greater number of questions or assign a higher weight to the intermediate difficulty levels, while reducing the number of questions at the extreme ends, namely the beginner and advanced levels. Examinations conducted using the conventional approach need a substantial number of questions. One major English proficiency test asks 200 questions in an exam that lasts 150 minutes. The testing company experiences advantages in terms of time efficiency since the expenses associated with applicant seat time are significantly decreased. This implies that they have the capacity to conduct further experiments within a certain timeframe.[85]

Adaptive testing makes an exam unique for each person by looking at how they answer questions. The questions come from a big database. When someone takes a test and does well, they are given more tough questions. When someone does poorly, they are given easier questions. The number of questions is another part of adaptable tests that can be changed to fit the test taker's needs. After a certain point is reached, the test will be over. The purpose of adaptive tests is to help with hiring people in a wide range of fields, from schools to businesses. Adaptive testing lets teachers improve current test banks, make sure exams are in line with school and program standards, get more information to help both students and teachers, and improve their teaching methods in ways that are sensitive to different cultures. Adaptive testing has a lot of good points. This testing tool helps both the companies that give the tests and the people who take them. Researchers have found that CAT can cut test time by at least half. This can help cut costs by a lot, especially for businesses that pay for seat time at training centers. Adaptive tests give managers data right away. In the classroom, this means that teachers can use test results to improve their lessons and the way they teach each student. For hiring reasons, it gives a clear picture of a candidate's skills more quickly than standard tests.

In adaptive testing, each person may see different things, but they are all scored on a percentile scale that takes into account how hard the questions are. This tells teachers how skilled each kid is. In the same way, it lets

[83] https://www.englishatvantage.com/cambridge-computer-adaptive-testing, accessed on 26 Jul 2023
[84] https://adaptivex.io/benefits-of-adaptive-testing/, accessed on 26 Jul 2023
[85] https://www.youtube.com/watch?v=ABASwzrETbw, accessed on 26 Jul 2023

companies compare the skills of each candidate fairly. That's right—because they use big testing pools, adaptive testing is more effective and lets the company make the test more accurate than a regular test. In the end, teachers will have a good idea of how each student is doing and what they need. In the same way, companies get a clear picture of which candidates are skilled and which ones are not. When companies want to improve their current workers, adaptive testing helps them find skill gaps, set priorities for employee growth, and get the most out of their investment. Because each person taking an adaptive test is pushed in the right way, the experience is better generally than a standard test. Low performers won't be put off or scared, and high performers won't get bored and might even enjoy getting harder things. The experience of taking a better test will make students of all levels work harder than they might on a regular test. High performers will be pushed in a good way, and low performers will feel more at ease. Again, adaptive test algorithms are very adaptable and can have millions of different versions. This makes them much safer than giving a group of people a standard test with X number of questions. Because an adaptable test comes in so many forms, it can be taken more than once. If a student has trouble on a CAT, the teacher can make sure they get the right kind of help. When the student is ready, they can take the test again and get a totally different test. The student can keep getting better at what they do this way. Administrators can use different kinds of voice, video, and images in adaptable tests because they are computer-based. For businesses, this means they can make the test fit the subject and the people taking it in the best way possible.

There is a recognition that each individual learns and tests differently. It is critical for educational institutions to address the requirements of all students, which is why adaptive testing can be so beneficial in assisting teachers in aiding their pupils. In terms of human resource solutions, CAT can assist speed up the hiring process so that neither the business nor the candidate wastes time. In reality, adaptive assessments are an excellent approach to improve individuals and boost a company's overall growth. CAT is a hybrid of two ancient technologies: computers and adaptive algorithms. The Stanford-Binet IQ Test, developed in 1905, was the first to adjust test material to the test taker.[86] These two methods are used together in modern CAT tests. CAT picks test questions based on how a person answered earlier questions. A lot of different schooling groups use CAT effectively. The Graduate Records Examination (GRE) and the Graduate Management Admission Test (GMAT) can now be taken in CAT style by graduate students. CAT is used in Idaho, South Dakota, Oregon, and Delaware right now. Delaware is the only state that uses CAT to hold people accountable.[87] The

new Common Core State Standards (CCSS) examinations will also include CAT. The Smarter Balanced Assessment Consortium has committed to adopting CAT, but the Partnership for Assessment of Readiness for College and Careers (PARCC), the other CCSS consortia, has elected to employ fixed form examinations. The CAT offers more trustworthy test results than the PBT. Each student receives the identical set of questions on PBTs. PBTs provide a good overview of performance for the majority of students (those who are average). However, there is evidence of decreasing dependability for pupils at the extremes of the distribution (extremely strong and very weak students). CATs offer better questions than PBTs and tailor test items to the student's ability level. If the test taker properly answers a question, the following question becomes more difficult, and if he or she poorly answers a question, the next question becomes simpler. When the complexity of the item closely matches the student's knowledge, test scores are more reliable. To adequately assess pupils, examinations must include 'Goldilocks' things: objects that are neither too difficult nor too simple, but are just right for the student's ability level. Consider an average 8th grade math student who subsequently takes 7th and 9th grade math tests. The pupil will most likely perform extremely well on the 7th grade test and extremely poorly on the 9th grade test. Unfortunately, none of those ratings provides a solid indication of the pupils' 8th grade math competence. A better test results from test items with a suitable level of difficulty.

Researchers have confirmed that CAT scores have greater reliability than PBT at the extreme ends of the distribution. Gage Kingsbury and Carl Hauser compared 'test information and measures of score accuracy and classification between fixed and adaptive forms of 4th and 8th grade reading and mathematics tests and noted that information at the extremes of the ability distribution was three times greater in the adaptive setting.'[88] In another study of CAT in Oregon, Tony Alpert found smaller standard errors for CAT than for PBT at the tail ends of the distribution.[89] When tests are reliable, students can be more sure that they would get the same score if they took the test again. It's not very reliable and doesn't tell you much if a student does well on one test and then fails a similar one later on. When lawmakers make test scores more important, the value of dependability only goes up. Giving the CAT is a lot cheaper than giving the PBT. Gary Phillips, Vice President and Chief Research Scientist at the American Institutes for Research, told Congress that he thought CAT was half as expensive as PBTs. Phillips said that the price of PBTs was too high because of the costs of

[86] "First Adaptive Test." 2012 Web. http://iacat.org/node/442, accessed on 26 May 2023

[87] Wang, Shudong, et al. "Construct Validity and Measurement Invariance of Computerized Adaptive Testing: Application to Measures of Academic Progress (MAP) Using Confirmatory Factor Analysis." Online Submission (2012). Web. <www.doe.k12.de.us/dcas/files/Vol4_RelVal_Report.pdf, accessed on 26 May 2023

[88] Quoting Stone, Elizabeth, and Tim Davey. "Computer-Adaptive Testing for Students With Disabilities: A Review of the Literature." (2011), accessed on 13 Sep 2023

[89] Alpert, Tony. "A coherent approach to adaptive assessment." National Academies, Board on Testing and Assessment and The National Academy of Education Workshop, Best Practices for State Assessment Systems, Washington, DC. 2010, accessed on 26 May 2023

printing, sending to schools, and marking them.[90] The Brown Center on Education recently estimated that states spent roughly $1.7 billion on standardized testing each year.[91] Schools may incur more expenditures in the short term as a result of updating or acquiring computers. However, in the long run, schools will save a lot of money. CAT takes pupils less time to complete, freeing up teaching time during the school day. Walter Way

discovered that CAT requires fewer test items to obtain the same degree of accuracy as PBT. When questions are personalized to the test taker, time is saved and unnecessary simple or difficult questions are avoided. Way discovered that some adaptive exams may be completed forty to fifty percent faster than paper tests.[92]
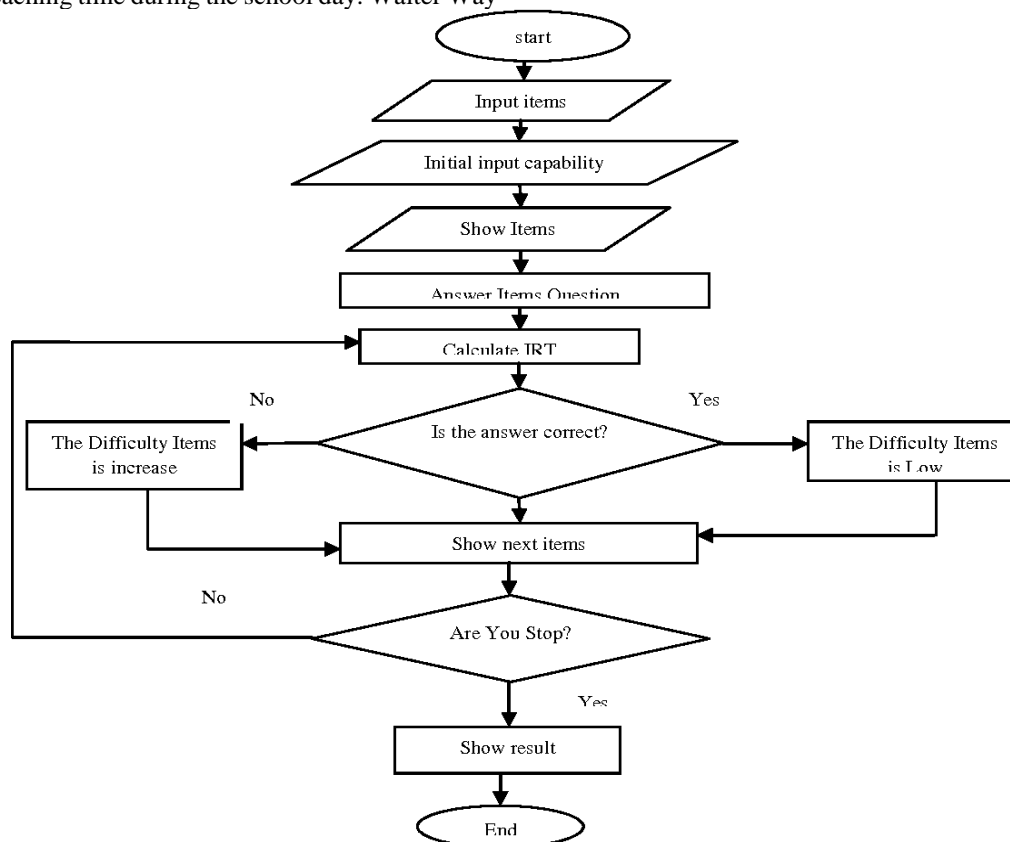

Figure 7: Follow diagram of Computerized Adaptive Test (CAT)[93]

Policymakers like the idea of spending fewer minutes on tests because American schools don't have enough time to teach. One more benefit of CAT is that it lets you include test questions that boost trust. Students get nervous when they have to take tests. Standardized tests should have high stakes, but stress can also make it harder to do well in school. CAT keeps track of students throughout the test, so it can include things that boost confidence that aren't scored. There aren't any groups or states that use test things in this way, but it would be easy to add them. Joshua Hausler and Markus Sommer looked into things that boost confidence and found that students had more self-confidence when they had motivation items. Also, they couldn't find any proof that adding these things to the test changed the results.[94] With minimal drawbacks, including confidence-boosting products has the potential to help reduce test anxiety. Another advantage of CAT is its simplicity of usage for special education pupils. Many children with disabilities might demonstrate competency on paper-based assessments, but they would need accommodations such as a reading assist to do so. Text to speech, voice to text, and test item magnifying are all simple tasks for computers. Simple modifications might allow many kids to engage in the same accountability systems as their peers in general education. This saves resources while also holding all pupils to the same standard. For decades, PBT was the dominating test format. Computers have advanced to the point that they now provide a considerably greater platform. They provide more precise evaluation for less money. CAT frees up important instructional time while also reducing student anxiety. Student test scores are being used by an increasing number of education stakeholders to drive policy decisions ranging from school closures to

[90] Phillips, Gary W. "Testimony for the US Senate Committee on Health, Education, Labor and Pensions." (2010)
[91] Chingos, Matthew M. "STRENGTH IN NUMBERS." (2012), accessed on 13 Sep 2023
[92] Way, Walter D. (2010, June), Some perspectives on CAT for K-12 assessments. Presented at the National Conference on Student Assessment, Detroit, MI, accessed on 13 Sep 2023

[93] https://www.semanticscholar.org/paper/Computerized-Adaptive-Test-based-on-Item-Response-Kusti-yahningsih-Cahyani/, accessed on 13 Sep 2023
[94] Hausler, Joachtm, and Markus Sommer, "The effect of success probability on test economy and self-confidence in computerized adaptive tests," Psychology Science 50.1 (2008): 75, accessed on 13 Sep 2023

tenure awarding. As this tendency continues, education stakeholders make an unspoken commitment to administer credible examinations. As a result, employing CAT is part of keeping that commitment.

Stealth Assessments

An important part of good teaching is measuring how much students have grown. Formative and final tests are the two main types of tests. Formative tests are usually given during a unit or lesson. These tests find out what a student is good and bad at so the teacher can change how they teach. Summative evaluations are tests at the end of a unit that give students feedback. There is a small difference that depends on what the teacher wants to draw from the data or how they plan to use it. When it comes to generality, final tests are very important. In this case, a student will not get a diploma if they fail the graduation test. Formative tests aren't always low-stakes, but sometimes they are. They allow you to change your direction in the middle of your trip without being punished. The information that initials evaluations give teachers is very important for good teaching. Standardized tests and formative tests have a lot of the same problems. Another thing that takes time away from teaching is giving initial exams. Creating tests that are useful for a class and not just for testing students' knowledge takes time and skill. To get the most out of initial exams, you need to think about what your students need and then change how you teach in the future. Formative assessments are strong training tools, but they require a lot of time and money. The use of stealth tests is a big step forward in test technology. Formative tests are hidden in games as "stealth assessments." Professor Valerie Shute at Florida State University and her colleagues created the first secret test. They didn't mean to trick students, but rather to collect data in a way that wasn't obvious.[95] They gather data on student learning, which teachers may subsequently utilize to improve and personalize education. Shute has uncovered several advantages to stealth evaluation. Stealth assessment addresses certain well-known educational resource issues. The low stakes situation brings benefit in terms of psychometrics. Psychologists have long recognized that seeing how youngsters play provides insight into the learning processes. Students' behavior changes as the stakes are raised, and they utilize different tactics to solve problems in a sandbox than they do when taking the SAT. Because students' behavior varies when engaged in a game rather than when concentrating specifically on an evaluation, stealth assessments collect different data than high stakes tests. Another advantage of games is the way they inspire pupils. Games immerse the player in a narrative, and the player becomes an integral part of the plot. Playing games encourages kids to push themselves even when they face difficulties. Paper and pencil tests, on the other hand, do not encourage students. Students' willingness to play stealth assessment games outside of the classroom might be a big help to instructors since it would give data without taking up classroom time.

Students are learning English in places all around the world. Because of poverty or geographic remoteness, many of these schools lack trained English teachers. Engkey not only supplements language instruction but also connects teachers and students. Monitors in new Engkey versions allow teachers to teleconference from anywhere in the world. Almost every school now has access to highly competent language instructors thanks to Engkey. MOOCs can help universities break through enrollment barriers for entry-level survey courses. In six years, slightly more than half of students graduate from four-year public institutions.[96] One reason for this sad figure is that the courses needed to graduate are not available. Because a class is full, students shouldn't have to pay for the whole semester's fees. MOOCs give students more freedom and get rid of the red tape that keeps them from finishing on time. Lawmakers need to change privacy rules so that data from games played outside of school can be collected. This information should be stored in current education data systems, so districts should make tools to do that. Teachers need to talk to parents to get permission to record data from the games their kids play and use it in evaluation tools. These changes will make sneak reviews more useful. Leaders should base budget choices on real-world study. Costs can be cut by making smart choices after evaluating them. One thing that makes the tools in this study stand out is that they can collect data. As soon as "big data" is available, there will be a huge amount of study in education. Collecting the data is the main thing that stops those sets from being made. Using new tools will make it easier to collect data that can be used to improve teaching and show which programs work best. Schools can save money by getting rid of services that don't work. Policymakers should think about more than just how much a new technology cost. They should also think about how it could change things. A truly meritocratic school system can be made with technology. We think that kids need the same amount of time to learn the same things in the status quo. If a student can show that they understand a college-level physics class through self-directed learning, then making them spend hundreds of hours in a high school class is not a good idea. New testing tools can more accurately find out how well a student has learned. This means that judges will have even more chances to collect data from games and other tests. A more merit-based education system will be possible if students have more chances to learn and show what they can do. Students are not expected to do well on assessments. No matter what kind of background a student has, they can use technology to get credit for their work.

[95] Shute, Valerie J. et al, (in press). Measuring and supporting learning in games: Stealth assessment, White paper for MIT series, published by the MacArthur Foundation, Web, http://myweb.fsu.edu/vshute/pdf/ white.pdf, accessed on 26 May 2023

[96] http://nces.ed.gov/ipeds/, accessed on 26 May 2023

Figure 8: AI in student assessment[97] and Stealth assessment[98]

Analysis of Teacher and Teaching Method

Teaching is a complex job that includes a number of rote but time-consuming tasks. Tools that facilitate the memorization of basic facts free up teachers to help students who need personalized interventions. Every extra minute spent teaching makes a difference over the course of the school year.[99] New developments in testing technology might be good for both teachers and students. That way, teachers won't know if their students have understood the lesson and lawmakers won't know if their changes have worked. Since the optical scan answer sheet was first made fifty years ago, assessment technology hasn't changed much, if at all. New tools for testing can help lower the cost of testing, and some of them let tests be given accurately in real time. Thanks to improvements in tests, students can be graded in a setting with low risks. In the past few years, it has been suggested that social robots could be used to teach and guide both kids and adults. Robots have been shown to be good at teaching both facts and skills. Now we want to look into how social robots can be used to help young children learn a second language. As situated, grounded, and social learning are all important parts of language learning, and contact and repeated practice are at the heart of all three, social robots have a lot of potential as teaching tools to help people learn a second language (L2).[100] Cheating on tests and a lack of understanding into student comprehension of a class are two major issues that instructors confront nowadays. This is also the most significant issue with online assessments, because professors sometimes do not know whether pupils have access to another device while completing the test. This issue might have long-term ramifications, owing to educational institutions' incapacity to ensure that students have the information required for further levels of education or to accomplish their work. On the other hand, with the incorporation of technology into the curriculum, the teacher's function as an authority figure and mediator is gradually decreasing. It should be mentioned that the advent of some apps and automation in education has resulted in a decline in the number of instructors in modern schools.

Nevertheless, the surviving educators are burdened with even more obligations compared to previous circumstances, yet their remuneration fails to commensurately reflect the increased responsibilities, resulting in a significant number of them being compelled to relinquish their positions. Once again, while discussing the benefits of technology in the realm of education, it is worth noting that students are afforded the ability to avail themselves of a vast array of material, hence rendering their lessons more captivating. However, it is pertinent to inquire about the temporal investment required for the preparation and integration of this content into a cohesive and relevant framework. The concept of increasing obligations mostly pertains to the many preparations required for academic classes. These preparations are often underestimated by many individuals, largely due to the fact that they are not readily apparent to parents. The issue at hand pertains to the treatment of teachers within educational institutions, which necessitates a resolution. It is imperative that teachers are no longer regarded as mere manual laborers. To initiate progress in this regard, it is crucial to augment their remuneration and afford them the respect they rightfully merit. Failure to do so may result in the presence of disengaged teachers who exhibit apathy towards imparting knowledge to their students. Consequently, this may lead to the emergence of a generation that lacks the capacity to contribute meaningfully to society. Diverse perspectives exist about the implementation of these modifications within the school system, particularly when they are introduced abruptly and within a limited timeframe. However, one should be realistic, because the positives still much exceed the problems. The persistent emphasis on drawbacks should not be interpreted as a longing for a return to conventional education, but rather as a call for prudence and an opportunity to critically examine the limitations

[97] https://blog.eera-ecer.de/artificial-intelligence-in-student-assessment/, accessed on 26 May 2023
[98] https://www.slideshare.net/g4li/what-is-stealth-assessment, accessed on 26 May 2023
[99] Expanded Learning Time by the Numbers, Center for American Progress, April 2010. Web. http://www americanprogress.org/issues/education/news/2010/04/22/7716/expanded-learning-time-by-the-numbers/, accessed on 29 Jul 2023
[100] Spaulding S, Gordon G, Breazeal C (2016) Affect-aware student models for robot tutors. In: Proceedings of the 2016 international conference on autonomous agents and multiagent systems, accessed on 13 Sep 2023

of educational technology and methodologies. The responsibility for evaluating the drawbacks in subsequent revisions and enhancing the instructional standards within both virtual and traditional educational settings lies on educational establishments and educators.

Benefits and Advantages of Technology Integration in the Education Sphere

Informational resources on the internet make early education far more accessible than in past generations. Because there are so many online resources, they can access research tasks without visiting an actual library.[101] The internet is a resource that makes books and high-quality information more accessible. It's not just the act of making and doing but also the sense of independence and power.[102] They have the ability to communicate in ways that words cannot. When children can answer their questions, they are more likely to conduct more research and pursue new lines of reasoning. It helps kids develop independence, academic confidence, and interest in new areas.[103]Technology develops skill to use modern technology for study for children and student and they use this skill frequently in their daily lives. In 21st century they should learn it at an early age to deal with challenges in education and other areas throughout their lives.[104] It teaches them how to avoid conflicts in school and in their daily lives.[105] It can strengthen their empathy skills and develop other positive attributes.[106] Social media can boost learners' confidence and prepare them for future social marketing opportunities. Kids and children can do many essential things online through social networking platforms. They can stay in touch with friends and family, make new acquaintances, share images, and exchange ideas.[107]

One significant advantage of technology in education is that it offers pupils with access to a vast amount of knowledge. They can get to the information as quickly as feasible. Instead of travelling to libraries and searching through stacks of books, a student may now get legitimate material at any time from a wide range of sources to prepare his/her assignment/project/homework, such as websites, Google, instructional sites, YouTube, videos, eBooks, PDFs, and so on.[108] With the rise of the World Wide Web (www), this is the first time that technology has changed the way students learn. Students can get as much data and information as they want on their computers, tablets, or phones with just a few clicks. This means that any student can plan a lesson or write a paper without help. With this in mind, technology helps students learn more and become smart citizens of the world.[109] Students can access a huge variety of learning materials on the internet. They include scientific articles, journals, research papers, educational videos, tutorials/guidebooks, informational websites, online databases, and blogs of educators/authors.[110] Distance learning is a significant advantage of the internet for students. With the power of the internet, online education become a reality. Students can study just as well using a virtual screen or chat room. During the online session, they can share documents, vital resource links, and media assets with other students.[111]

Contemporary students are devoid of any experiential knowledge of a world devoid of sophisticated technological advancements. There was no necessity for them to endure a 45-minute waiting period for the loading of a new webpage, given the sluggishness of the dial-up connection. Educators that adopt technology in their instructional practices enhance their credibility and expertise, hence facilitating the integration of educational applications across many academic disciplines for the present generation.[112] Even just a single technological tool can make a major impact on the modern student. It wasn't that long ago when students were forced to drag heavy textbooks to class with them every day. Now most of those textbooks are available online and can be accessed through a computer. Organizational platforms complement the e-books and other tools that are available through technology so that the learning process is streamlined and effective.[113] Technology in the classroom is very vital for instructors. Today, there are engagement technologies that can begin to automate the grading process. Software platforms make it easy to analyze individual student performance and detect learning gaps more quickly. More time for real teaching and less time spent at home evaluating

[101] Spitzer M, (2014), Information technology in education: Risks and side effects. Trends in Neuroscience and Education, 3(3-4), 81-85, accessed on 28 Aug 2023

[102] Wallace, K. (2009, June 17), High-Tech Cheating on the Rise at Schools, Cbsnews. Available: https://www.cbsnews.com/news/high-tech-cheating-on-the-rise-at-schools/, accessed on 28 Aug 2023

[103]Roblyer M D, (2003), Integrating Educational Technology into Teaching, (3rd ed). Upper Saddle River, NJ: Merrill Prentice Hall, accessed on 28 Aug 2023

[104] https://bau.edu/blog/technology-impact-on-learning/, accessed on 24 Jul 2023

[105] Putnam R, (2000), Bowling Alone: The Collapse and Revival of American Community. New York: Simon and Schuster, accessed on 28 Aug 2023

[106] https://elearningindustry.com/how-important-is-technology-in-education, accessed on 24 Jul 2023

[107]Buckleitner Warren, (12 June 2008), "So Young, and So Gadgeted", The New York Times. Archived from the original on 23 December 2016, accessed on 28 Aug 2023

[108]Holstein, Kenneth; McLaren, Bruce M.; Aleven, Vincent (2018), "Student Learning Benefits of a Mixed-Reality Teacher Awareness Tool in AI-Enhanced Classrooms", Lecture Notes in Computer Science, Springer International Publishing,,ISBN 978-3-319-93842-4, accessed on 25 Aug 2023

[109]Reeves, Thomas C. (12 February 1998), The Impact of Media and Technology in Schools (PDF) (Report). University of Georgia, Archived (PDF) from the original on 20 October 2013, , accessed on 25 Aug 2023

[110]Van LeeuwenAnouschka et al, (December 2015), "Teacher regulation of cognitive activities during student collaboration: Effects of learning analytics", Computers & Education, 90: 80–94, accessed on 25 Aug 2023

[111]Hall, Ashley A.; DuFrene, Debbie D. (June 2016). "Best Practices for Launching a Flipped Classroom", Business and Professional Communication Quarterly. 79 (2): 234–242. doi:10.1177/2329490615606733. ISSN 2329-4906

[112] Hall Ashley A, (June 2016). "Best Practices for Launching a Flipped Classroom", Business and Professional Communication Quarterly, 79 (2): 234–242, accessed on 27 Aug 2023

[113]Technology in Schools: Weighing The Pros And Cons". Huffington Post. 25 May 2011. Archived from the original on 23 April 2014, accessed on 27 Aug 2023

work is created by automating more of the tiresome tasks that instructors undertake every day.[114] When students of any age are in a learning environment that is based on a lecture format, the amount of information they retain can be as low as 5%. Students who learn in a collaborative environment can retain up to 80% of the information they study.[115] And, if interactive practice is included in the classroom environment, information retention levels can reach 95% for some students.

Technology provides various platforms and apps that allow teachers to combine and use all information about their students that may be useful. It can also help teachers' group together students who may benefit more from learning together than learning apart.[116] Technology allows students to work at a pace that is comfortable for them. Curriculum demands or programs can be adjusted easier to meet individualized needs to enhance the learning process.[117] When technology is used in the classroom, students have more say over how they learn. It gives them a chance to follow their natural curiosity and find out what skills, hobbies, and abilities they have. Technological advances also let students try new things that might not have been possible in the past. For that reason, they can figure out on their own which methods help them learn new things the best.[118] Now, students learn how to research new subjects and how to properly source the data they find with the help of technology. These are all vital skills for the modern workplace and today's students have the opportunity to master them before they even start looking for a job.[119] When students enter their classrooms each day, they should be able to see the future. Stepping back in time may bring some delight via nostalgia, but it will not prepare pupils for the demands of a techno-logically based world. We may surely benefit from history's lessons, but we must also be prepared for what the future may contain once the curtain is lifted.[120]

The homework planner or task manager program that teachers use is one of the best things that has come from using technology in the classroom. They can be used instead of a school notebook or paper planner. Teachers can put in all of the days', weeks', or months' worth of work and projects. They can set due dates for them. They are kept up to date in real time as the kids begin, pause, and finish a job.[121] They can also track the individual performance, achievements, and pitfalls of the students. It helps them to decide their syllabi accordingly in the next learning session[122]Communication skills are crucial for students to do well in academics and the professional field in the future. It is difficult to make young children sit in one place and learn. They easily get distracted. Similarly, elder students find it tough to keep up their focus and complete large papers or assignments. All in all, education is not a pleasant experience for all students. But, with technology, it is now an enjoyable experience for all.[123] The use of tablets, laptops, VR/AR devices, and touch screen boards makes classes exciting for students. Teachers could easily keep up the attention of kids. [124] Learners in higher grades develop better abilities to communicate with various technological tools and virtual courses. We know that, many students are reluctant to speak with the teachers in class or front of others.[125] They can interact freely through chat, audio, or video call, during their independent screen time.[126] It will help student to use their additional knowledge to prepare academic lessons and surpass the scores of others. It also helps aspiring young talents to garner professional skills that will help them in the future to grow.[127]

[114]Sean, Allan (25 September 2020). "How Covid-19 brought the University of Toronto Class of '24 Together Online". Brooke Godfrey. Archived from the original on 9 August 2021, accessed on 27 Aug 2023

[115]Kaplan, Andreas (6 April 2021). Higher Education at the Crossroads of Disruption: the University of the 21st Century. Emerald Publishing Limited, ISBN 978-1-80071-504-2, Archived from the original on 29 January 2021, accessed on 27 Aug 2023

[116] Irby Beverly et al, (2013), Handbook of Educational Theories Charlotte, NC: IAP. p. 105. ISBN 978-1-61735-866-1, accessed on 27 Aug 2023

[117]Hergenhahn B R, (2008), An Introduction to the History of Psychology. Belmont, CA: Wadsworth Cengage Learning, p. 627, ISBN 978-0-495-50621-8, accessed on 27 Aug 2023

[118]Termos, Mohamad (2012). "Does the Classroom Performance System (CPS) Increase Students' Chances for Getting a Good Grade in College Core Courses and Increase Retention?",International Journal of Technologies in Learning. 19 (1): 45–56. doi:10.18848/2327-0144/cgp/v19i01/49144, accessed on 27 Aug 2023

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[120]Skinner B F, (1954), "The science of learning and the art of teaching", Harvard Educational Review, 24: 86–97,

[121]Cuban, Larry (2001). Oversold and Underused: Computers in the Classroom (PDF), Harvard University Press, Archived from the original (PDF) on 9 August 2017, accessed on 25 Aug 2023

[122]Day R et al, (1987), "Computer-managed instruction: an alternative teaching strategy". Journal of Nursing Education, 26 (1): 30–6. doi:10.3928/0148-4834-19870101-08, accessed on 25 Aug 2023

[123]"Baby DVDs, Videos May Hinder, Not Help, Infants' Language Development", University of Washington Press. 7 August 2007. Archived from the original on 15 February 2015, accessed on 25 Aug 2023

[124]D. Randy Garrison; Terry Anderson; Definitions and Terminology Committee (2003). E-Learning in the 21st Century: A Framework for Research and Practice. Routledge. ISBN 978-0-415-26346-7, accessed on 25 Aug 2023

[125]Moore, J. L. et al, (2011). "E-Learning, online learning, and distance learning environments: Are they the same?", The Internet and Higher Education, 14 (2): 129–135. doi:10.1016/j.iheduc.2010.10.001, accessed on 25 Aug 2023

[126]Boser U, (2013), "Are Schools Getting a Big Enough Bang for Their Education Technology Buck?" (PDF), American Progress, pp. 1–12. Archived (PDF) from the original on 17 May 2014, accessed on 25 Aug 2023

[127]Tanner Mirrlees; ShahidAlvi (22 October 2019). EdTech Inc.: Selling, Automating and Globalizing Higher Education in the Digital Age. New York: Routledge, p. 60, doi:10.4324/9780429343940. ISBN 978-0-429-34394-0, accessed on 25 Aug 2023

The different uses of technology, such as audio-visual presentations, virtual classrooms, wide-screen projectors, and digital planners help teachers to improve their delivery of instructions. This consequently enhanced the understanding and comprehension level of the students.[128] Besides, technologies increase the productivity of teachers. The digital tools they use not only increase the engagement of students but also provide them with more learning opportunities.[129] Actually, educational technology helped teachers to increase their productivity, which benefitted both the students and schools.[130] New tools like digital task planners, virtual classrooms, and eLearning apps are gaining prominence in the market. If they are aware of the trends of EdTech, they can use these tools to their advantage and make progress academically.[131] It improves the physical and mental well-being of students. Various digital tools eased their tedious learning courses and made them interesting. In many ways, EdTech methods improve their cognitive skills.[132] Virtual learning sessions and the integration of AR are two prime contributors. They enhance the capabilities of their brain to read, interpret, learn, remember, think, and use logic. All these hugely impact their academic learning and performance in the long run.[133] As they can score good grades/marks due to the use of educational technology, it gives them confidence and a positive feeling. This boosts their mental health and helps them to concentrate better on their studies.[134]

One of the assured benefits of using technology in education is improved collaboration between students and teachers. Online learning system not just enables the teachers to interact with students during lessons. It also allows the students to engage in one-to-one interactions with the teachers.[135] By staying at the home, they can upload their projects or homework, which teachers can access and give necessary recommendations.[136] In the case of collaborative activities like group projects, compare the situation of a classroom with a virtual classroom setting. There are a few groups of students and the teacher assigns them tasks. Chaos or confusion is inevitable as some students will be loud, some will ask questions, some will be shy to ask, and some could not get the opportunity to be heard.[137] Contrary to this, such a situation does not happen in an online setting. Every student is connected in the virtual classroom. The teacher responds and resolves queries of each of them individually, on independent screens.[138] In 21st century, online learning also fostered interactions between students outside the school. They can share ideas and resources for difficult projects and support each other.

Many schools and educators are replacing paper books with eReaders in the wake of rapid environmental damage.[139] The integration of technology in educational settings has facilitated the comprehension of environmental sustainability among contemporary pupils. The utilization of electronic and digital platforms for educational purposes not only contributes to environmental preservation but also offers enhanced ease for both educators and learners.[140] It assists people in saving money on various learning supplies such as books, notebooks, boards, paper planners, educational trips, and so on. The advantages of employing technology in education now will prepare children and students for a future that will be entirely digital. It also assisted them in establishing priorities for the usage of technology.[141] This will help them draw a line and use technology wisely. When students are familiar with different technologies from an early age, they can easily land a job in the desired company.[142] For job training and to teach them how to use computers, software, and online contact tools, their parents don't have to take them anywhere. Normal teaching methods and a competitive classroom are not good for special needs kids or students who aren't doing well in school because they make it hard for them to keep up with the lessons. For them to do better in school, they need extra help.[143]

[128]Harris J etal, (2009), "Teachers' Technological Pedagogical Integration Reframed" (PDF), Journal of Research on Technology in Education, 41 (4): 393–416, accessed on 25 Aug 2023

[129]Geng F, (2014), technologist,…discussed by @A_L_T members". Oxford, UK. Archived from the original on 5 August 2018,

[130] Fletcher S (2013), "Machine Learning", Scientific American, 309 (2): 62–68, accessed on 25 Aug 2023

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[132]Williamson Ben et al, (2020), "The datafication of teaching in Higher Education: Critical issues and perspectives", Teaching in Higher Education, 25 (4): 351–365, accessed on 25 Aug 2023

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[140] Nye, D. (2007). Technology Matters: Questions to Live With. Cambridge MA: MIT Press, accessed on 26 Aug 2023

[141]KimmeHea Amy C, (January 2014), "Social Media in Technical Communication", Technical Communication Quarterly, 23 (1): 1–5, accessed on 26 Aug 2023

[142]Suppes, P. (19 May 1971). Computer Assisted Instruction at Stanford (PDF) (Report). Archived from the original (PDF) on 17 July 2010, accessed on 26 Aug 2023

[143]Vie Stephanie, (3 July 2017), "Training Online Technical Communication Educators to Teach with Social Media: Best

There are digital apps that allow teachers to set individualized learning programs and schedules for them. It also assisted teachers to teach students with ADHD (Attention-deficit/hyperactivity disorder) or such issues, independently.[144]

Now, with the digital transformation and the rise of educational technology, teachers have begun making drastic changes to their instruction, assessments, even the physical make-up of their classrooms, and at a much faster rate than expected.[145] These current trends are making headlines in education because of the ways in which they are impacting student learning.[146] Again, modern classrooms are outfitted all over the country with iPads and laptops for each student.[147] Google Chromebooks account for over half of the devices in US classrooms. In 2014, more than three million Chromebooks were used in educational institutions.[148] And that number is growing continuously. Virtual reality has the capability of bringing the outside world into the classroom and vice versa.[149] Apps such as Unimersiv can transport students to ancient Greece, while Cospaces allows students to share their virtual creations with the world.[150] According to Kathy Schrock, an online adjunct professor at Wilkes University and an independent educational technologist, virtual reality has the capacity to enhance visual literacy, technical literacy, and audience engagement. The concept of integrating Augmented Reality, Virtual Reality, and Mixed Reality (AR/VR/MR) is eagerly awaited in academic circles. Consider, as an illustration, the privately held enterprise Magic Leap.[151] Even though it has yet to really sell anything, Magic Leap is already valued at four and a half billion dollars! This speaks to the projected endless possibilities of technology transforming classrooms.[152]

21st century classrooms are SMARTboards instead of chalkboards and pods of SMARTdesks instead of individual seating.[153] In this day and age, students don't just read books; they go on virtual field trips and make media instead of just looking at it. Colleges and universities are making learning places on campus less rigid because they know how important it is to create and work together all the time, not just during class. Even though it's not new, IoT has to be at the top of our list because technology has come so far. In the past, when educators talked about IoT, they mostly talked about things like making schools and colleges more energy efficient. Once teachers have this important data, they can tell if their lessons are helping students, if the homework is too hard, or if students are staying up late to finish it.[154] This is a valuable insight as it would enhance future digital transformation trends in education. Also, it can help students gain momentum for homework time at home.[155] The use of AI in higher education has already proven useful. Australia's Deaken University used IBM Watson to create a virtual student advisory service that was available 24-hours a day, seven days a week.[156] Use for AI includes chatbots, Siri, personalizing learning, evaluating the quality of curriculum and content, and facilitating one-on-one tutoring with the use of Intelligent Tutoring Systems. Actually, technology doesn't aim to replace teachers, only to complement them.[157] Adaptive learning technology collects information about student behavior as they're answering questions, and then subsequently uses that information to provide instant feedback in order to adjust the learning experience accordingly.[158] In adaptive learning where students make critical decisions such as the task to be completed in the timeframe and the path chosen.[159] Adaptive learning involves collecting data about students' behavior as they counter and overcome problems and later provide feedback.[160]

Benefits of Integrating Technology in the Classroom

The integration of technology into education not only offers many advantages to eLearning, but also

Practices and Professional Recommendations". Technical Communication Quarterly, 26 (3): 344–359, accessed on 26 Aug 2023

[144] https://www.tryclarifi.com/adhd-student-planner/, accessed on 26 Aug 2023

[145] https://www.brookings.edu/articles/promises-and-pitfalls-of-online-education/, accessed on 26 Aug 2023

[146] https://www.forbes.com/sites/danielnewman/2017/07/18/top-6-digital-transformation-trends-in-education/?sh=37ae58902a9a, accessed on 26 Aug 2023

[147] Hickey Ryan, (12 May 2014), "The history of online education", Peterson's, Archived from the original on 19 March 2018, accessed on 26 Aug 2023

[148] https://www.cnbc.com/2015/12/03/googles-chromebooks-make-up-half-of-us-classroom-devices.html, accessed on 26 Aug 2023

[149] https://www.eschoolnews.com/featured/2017/01/02/hot-edtech-trends-2017/, accessed on 26 Aug 2023

[150] https://www.thetechedvocate.org/20-top-virtual-reality-apps-that-are-changing-education/, accessed on 26 Aug 2023

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[152] https://campustechnology.com/Articles/2017/01/18/11-Ed-Tech-Trends-to-Watch-in-2017.aspx?Page=1, accessed on 26 Aug 2023

[153] https://www.benq.com/en-in/business/resource/trends/steps-and-checklists-to-build-a-blended-learning-classroom.html, accessed on 26 Aug 2023

[154] https://elearningindustry.com/digital-trends-in-2019-shape-education-5, accessed on 26 Aug 2023

[155] Hossain, K. A., Evaluation of Influence of Internet of Things (IOT) Technologies and Devices in 21 Century, Scientific Research Journal 11 (7), Jul 2023, accessed on 26 Aug 2023

[156] https://campustechnology.com/Articles/2017/01/18/11-Ed-Tech-Trends-to-Watch-in-2017.aspx?Page=2, accessed on 27 Aug 2023

[157] Hossain K. A., Evaluation of Influence of Artificial Intelligence (AI) on Technologies in 21st Century, Journal of Eiectronics and Communication Engineering Research, Quest Journal, Jul 2023, accessed on 27 Aug 2023

[158] https://onlinedegrees.sandiego.edu/what-is-educational-technology-definition-examples-impact/https://www.adaptemy.com/, accessed on 27 Aug 2023

[159] Harasim, L., Hiltz, S., Teles, L. and Turoff, M. (1995), Learning Networks: A Field Guide to Teaching and Learning Online. Cambridge, MA: MIT Press, accessed on 27 Aug 2023

[160] McCue, T. J. (27 August 2014). "Online Learning Industry Poised for $107 Billion in 2015". Forbes. Archived from the original on 25 August 2017, accessed on 26 Aug 2023

adds a twist to the eLearning definition.[161] The profession of teaching encompasses a multifaceted role that entails the undertaking of several labor-intensive responsibilities. The utilization of tools that enhance the retention of fundamental information enables educators to allocate their time and resources towards providing individualized support to pupils requiring specialized interventions. Each additional minute dedicated to instruction has a discernible impact throughout the duration of the academic year. There are several discernible benefits associated with the incorporation of technology into the educational setting, which are delineated below.

➢ Technology in the classroom does have a cost, but it is a minimal one. For less than the price of a set of textbooks, students can be given a Google Chromebook instead and access all of their books from it.[162] Students could have access to the computer in the classroom – if not take it home every day as well.[163]

➢ **Students can study at their convenient time and from anywhere from the world. It makes education versatile.** [164] For example, a person who is working can decide to take a course online and not worry about time to attend classes. [165] They just have to figure out how to balance work with school. [166]

➢ Technology in the classroom can boost learning motivation. Most kids and students enjoy using technology in some way. [167] It allows active learners to remain engaged with the lessons and encourages not-so-active learners to find something that they might classify as fun.[168] One of the best advantages that technology provides to the classroom is an increased level of motivation.

➢ **Students, business people and IT specialists can get their desired certificates online.** For example, a person seeking a real estate license can go online and take courses to get real estate license. [169]

➢ **Today, use of technology in education enhances competencies beyond knowledge and skills.** It results in improved understanding of concepts that are complex and will lead to connecting ideas, processes, and learning strategies in students and even teachers regarding problem-solving. [170]

➢ **Integration of technology in education and the classroom makes learning enjoyable and interesting.** It can even be used for remote learning opportunities if the stimulus of a classroom is too much for the student. [171]

➢ **It makes teaching easy.** Teachers may attend and take class from his suitable places. It also helps them to prepare class more effectively and professionally.[172]

➢ It offers a wider choice of materials that can be accessed easily. The vast array of educational technology that is available today offers students a wide range of options from which they can choose the best ones for their learning needs. [173] This helps them develop the right kind of skills and knowledge so that they can become good professionals in their chosen field.

➢ It helps to improve learners' communication skills and performance in school and workplace settings. Students and earners who are able to communicate better through technological means will also perform better academically as well as in work settings because communication skills are very important when you want to get your point across effectively.

➢ It provides fun and engaging learning experience for students. Today's learners are not only required to learn but they also need to have fun while doing so. [174] Educational technology offers students the opportunity to have fun while learning, which will also help them stay motivated and excited about their studies.

➢ It allows learners to access the internet from anywhere at any Time. The internet has become such an integral part of our lives that we hardly find people

[161] https://elearningindustry.com/4-tips-to-create-a-work-school-balance-while-taking-online-courses

[162] https://www.globalsources.com/manufacturers/dell-chromebook-3100-2-in-1-11.6-inch-touch.html?, accessed on 27 Aug 2023

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[169] https://www.usnews.com/higher-education/online-education/articles/2017-05-03/study-online-learning-enrollment-rising-fastest-at-private-nonprofit-schools, accessed on 27 Aug 2023

[170] http://virtuallyinspired.org/portfolio/osmosis/, accessed on 27 Aug 2023

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[174] Al-Asfour A, (2012), "Online Teaching: Navigating Its Advantages, Disadvantages and Best Practices". Tribal College Journal of American Indian Higher Education, 23: 3, accessed on 26 Aug 2023

who do not use it on a daily basis. In today's world, it is essential for students to be able to access the internet from anywhere at any time so that they can do their assignments and research without having to travel all over a place or wait for a particular time when they can do so. [175] Using educational technology helps learners in this regard because it allows them to connect with the internet even when they are in a classroom, school, or at home.

➤ It helps learners learn new skills and acquire new knowledge. Learning new skills and acquiring new knowledge are two very important aspects of life that learners should be able to enjoy. Through the use of educational technology, learners can acquire these skills and also develop their knowledge through various programs that are available online. These programs offer students the opportunity to learn about various topics that are interesting and useful for their respective fields of work or studies. [176] It helps students and learners stay up to date and well informed with new technological advancements.

➤ It allows students to improve themselves both mentally and physically. The benefits of using educational technology also include the improvement of learners' mental and physical health. [177] By using these tools, students are able to enhance their learning and their cognitive skills, which in turn help them, improve their academic performance as well as their physical health. [178]

➤ Playing and learning collide when classrooms utilize gaming as an instructional tool. Gaming technology makes learning difficult subject matter more exciting and interactive. [179] Today, virtual game worlds provide a unique opportunity to apply new knowledge and make mission-critical decisions, while identifying obstacles, considering multiple perspectives and rehearsing various responses.' [180]

➤ Now, teachers can tutor the students from distance or communicate easily outside the classroom. This enhances their ability to give instructions, improve the learning of students, and help them get better academic scores. [181] Moreover, technology integration in education resulted in mobile/desktop applications that are helpful as digital attention coaches for students.

They helped teachers to organize the homework or tasks of students. They can easily know whose grades are lower or who is slow in completing lessons. They can provide the necessary guidelines to them and help to gradually improve their academic performance. [182]

Limitations and Challenges of Technology in Education

The modern classroom has taken several steps forward in its evolution of the learning environment in the past 25 years. Many of the benefits that we have seen in this setting are due to the introduction of new technology options for students. Instead of having a single computer for a class to use or a laboratory environment for the entire school placed in one room, we can now help students learn at their table or desk with items issued to them directly. [183] Our development of the Internet since 1989 has helped us to include more technological access to information in the modern classroom as well. If you grew up as an 80's kid, then you had the A/V cart come into your class to watch educational videos and maybe have a snack. Now students get to play interactive learning games, compete against other students, and have their educational statistics tracked in real-time data to know where their point of focus should be. Introducing technology to students in a classroom setting can certainly help the educational environment, but it also requires equal access for all students to ensure that everyone receives the same opportunities to success. That is why each school district, teacher, and parent should periodically review the advantages and disadvantages of technology in education settings. [184]

A built-in study found that over 90% of teachers believed that technology helped them reinforce courses and favorably improve student performance. Other research found that after embracing technology and digital tools, the majority of middle-school children increased their test scores or grades. Despite this optimistic situation, the employment of technology in education is fraught with difficulties. Excessive screen time caused by educational technology can have a detrimental impact on pupils' attentiveness. There are also concerns about instructors' ability to use tools or technology ideas such as AR, VR, and AI. Because of a

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[180] https://campustechnology.com/Articles/2017/01/18/11-Ed-Tech-Trends-to-Watch-in-2017.aspx?Page=3, accessed on 27 Aug 2023

[181] J. Bransford; A. Brown; R. R. Cocking, eds. (2000), "Technology to support learning". How people learn: Brain, mind, experience. Washington, DC: National Academies Press. pp. 206–230, accessed on 25 Aug 2023

[182] "Global E-Learning Market 2017 to Boom $275.10 Billion Value by 2022 at a CAGR of 7.5% – Orbis Research", Archived from the original on 27 May 2018, accessed on 25 Aug 2023

[183] Algerioy A. M., (1999), The impact of multimedia on the collection of first-grade students in secondary mathematics in Riyadh Journal of King Saud University - Languages and Translation, 24 (2), 75-82, accessed on 28 Aug 2023

[184] https://futureofworking.com/10-advantages-and-disadvantages-of-technology-in-education/, accessed on 28 Aug 2023

shortage of resources, many schools were unable to afford the technology. Teachers and students face a number of hurdles in order to succeed in the face of educational technology. If sufficient security measures are not implemented, computers can give young children with access to inappropriate content or information. Website blocks, internet filters, and constant supervision can assist to protect youngsters from such exposure, and courses in 'netiquette,' or correct internet use, can implant good web judgment and habits in children at a young age. According to studies, more people are getting detached and isolated as a result of the connections that technology gives through social networks. Young children who spend more time interacting with electronics may spend less time socializing with their classmates, which can have an impact on their social and emotional development. To mitigate this danger, it is critical to limit 'technology time' so that children may connect socially with family and friends. Many technology-based games and activities are 'pre-made,' allowing youngsters to perform tasks without needing to solve problems in novel and inventive ways. There are, however, just as many games that encourage creative growth and problem-solving abilities while still functioning as an enjoyable solitary or group activity. Choosing the latter, as well as giving a wide range of additional learning materials, such as manipulatives or painting supplies, will guarantee that your children benefit from their play time in a safe and productive manner.[185]

Even though there are many good things about educational technology, the bad things should also be thought about. You can see that computers have some limits: they can't solve all of our problems. People can think in a lot of different ways, while computers can't do some things, like brainstorm or come up with new ideas. The knowledge on the internet is not always correct or useful, which is another problem with using technology in schooling. Online, there are lots of ways for people to lie about what they've done and what they know about something to get credit for things they didn't do or know nothing about. Before you use something, you find on the internet, you should always get it checked out. Also, students who take classes online are known to get sidetracked by their phones or other electronics when they need to focus on their work or studies. They might lose attention and not do their work right because of this. Some people might not want to take classes online because they don't feel like they are really learning. This is the last problem with technology in education. Some people like going to class in person because they can see their peers' faces and get to know them better. They can also see how much everyone else knows about a subject. There are, however, many types of online courses that you can use if you want to take classes online. These include mobile learning, live virtual classrooms, online videoconferencing, and more. We've talked about the problems and restrictions of using technology in school below. Here is a summary of the challenges that they mostly face while adopting educational technology.

According to a recent study, it was observed that educators who possess tablet-based gadgets in their classrooms are prone to encountering distractions during instructional sessions. The presence of technology in the classroom led to a lack of focus among students, resulting in their disengagement from the subject matter. According to experts, it is advisable to reduce the utilization of technology inside educational settings due to its potential to serve as a source of distraction, hence leading to more disruptions.[186] Students are sure to get distracted by things like laptops and tablets in the classroom. This is especially true if the software doesn't block access to apps that have nothing to do with lessons, quizzes, and other educational activities.[187] There must be a mechanism to control the usage of electronics in schools so that they are utilized to assist pupils learn rather than to play games or use social media for entertainment. Concerningly, high school pupils may be more knowledgeable about technology than their professors. Students can access sites that aren't permitted by navigating to a proxy site that provides material from other sites without actually visiting those sites. Although the pace with which technology advances may appear to be an obvious benefit, experienced instructors are wary of it. Devices and programs that assist you in learning can learn quicker than the human mind. Students may gloss over details, missing out on texture and depth. Thinking clearly and logically takes time. Students who utilize technology have less need to communicate with their professors and with one another. With online teaching and learning, there is no face-to-face interaction. To address this, teachers should ensure that oral presentations, recitations, and group work occur often in the classroom. We must remember that our purpose is to assist them in becoming well-rounded adults.[188] For teens and young adults who spend too much time on games or social media, school could be a break. Teachers are the ones who need to notice when students have their screens out for too long. Kids should be pushed or encouraged to connect with each other when they're not on technology.[189] Advances in technology allow students to learn at their own pace, and on their own time. But it may not be a

[185] https://elearningindustry.com/the-limitations-of-educational-technology, accessed on 28 Aug 2023

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[189] Carter S P. et al, (2017). Should Professors Ban Laptops? EducationNext, 17(4), 68-74, accessed on 28 Aug 2023

good thing when personal relationships are lost in the process.[190]

Students may believe that technology may help teachers save time on their to-do lists, but this is not always the case. Technology evolves at such a rapid pace that it may give both instructors and students difficulties. Teachers frequently need to acquire new topics while they are being evaluated by academics. To make problems worse, upgrades and adjustments are constant.[191] Experts say we should spend time on the things that are important, not spending time on technology that isn't. You might think that technology is the answer to better education, but it doesn't have to be. Teachers will always be necessary in order to guide and mentor students.[192] The best technology is one that lets students talk to and meet with teachers in person. There is a lot of information on the internet these days, but not all of it is correct. It's not always safe to believe what you read online, even if it comes from a strong source. Websites care more about how they rank these days than about what information they give visitors. To get more people to visit their sites, many of them post fake information, even if it's not true.[193] Now in TV shows and movies where kids would break into a teacher's classroom, steal the answer key to a test, and then write down everything on their wrist, shoe, or a slip of paper? Now a student can send themselves a text with that information.[194] They may disseminate such information to anybody with a phone. Email can also be used to send this information. In addition, strong restrictions must be in place regarding the usage of technology during quizzes or examinations when an accurate evaluation of student understanding is required to evaluate their overall development.[195] Eye pain does happen when we stare at a computer screen for too long. Back pain, eye pain, neck pain, tiredness, fuzzy vision, and trouble focusing are all signs of this problem. A condition called early myopia can happen to more than 60% of people older than 12 who use computers a lot and for long periods of time. For some people, this health problem gets worse over time. This means that the time they spend on their phone, computer, or TV can also cause eye health problems.[196]

Today, there is a lot of material on the Internet that is false or exaggerated in some way, yet it appears to be true. According to New York Magazine study, less than 60% of online traffic now is through human-based searches or content engagement. Bots that pose as individuals account for up to half of all YouTube traffic each year. Not only is the information occasionally fraudulent, but the users may also be phony.[197] Whether technology is in the classroom or at home, there is the issue of affordability to worry about in today's world. Some households cannot afford to purchase computers for their kids to manage their school work.[198] Students with greater access can learn more and have access to lessons more often, which means they have additional information exposure that can increase their opportunities to succeed.[199] Interactive learning lessons are so effective today that the software or app can become the teacher instead of having someone present to help a student. Instead of being in a hands-on role, technology makes the teacher more of an observer.[200] New technology simplifies the process of learning and changes to meet the needs of each student. Every year, more than 15 million people have their identities stolen in some way. Over US$ 16 billion is lost every year because of this evil business. Because of this problem, over US$ 100 billion has been lost since 2011. More people can use technology these days, which is one reason why it's becoming more common. Whenever we bring technology into the classroom, we put our kids' identities at risk every day.[201] Even though applications, laptops, mobile devices, and operating systems have powerful privacy filters that lower the danger of identity theft, there is no way to ensure that all threats are eliminated unless the equipment is never connected to the internet. If we go this route, we will lose many of the benefits of having technology in the classroom in the first place.[202]

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[193]Cazan A et al, (2016), Computer anxiety and attitudes towards the computer and the internet with Romanian highschool and university students. Computers in Human Behavior, 55, 258-267, accessed on 28 Aug 2023

[194]Trentin G. (2010). Networked Collaborative Learning: Social Interaction and Active Learning Archived 17 September 2018 at the Wayback Machine, Woodhead/Chandos Publishing Limited, Cambridge, UK, ISBN 978-1-84334-501-5, accessed on 28 Aug 2023

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[197]Dansieh S. A., (2011), SMS Texting and Its Potential Impacts on Students' Written Communication Skills. International Journal of English Linguistics, 1(2), 222-229, accessed on 28 Aug 2023

[198]Denoël, E. et al, (2017), Drivers of Student Performance: Insights from Europe. Mckinsey& Company, accessed on 28 Aug 2023

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[201]Epper R et al, (2001), Teaching Faculty How to Use Technology. USA: American Council on Education. Oryx Press, accessed on 28 Aug 2023

[202]Seely Brown et al, (2008), "Minds on Fire: Open Education, the Long Tail, and Learning 2.0" (PDF). Educause Review (January/February 2008): 16–32. Archived from the original (PDF) on 16 July 2014, accessed on 28 Aug 2023

Even though applications, laptops, mobile devices, and operating systems have powerful privacy filters that lower the danger of identity theft, there is no way to ensure that all threats are eliminated unless the equipment is never connected to the internet. If we go this route, we will lose many of the benefits of having technology in the classroom in the first place.[203] Only clear boundaries and expectations to follow can counter this issue so that technology can provide a needed learning opportunity.[204] Technology makes it easy for people to talk to each other, which is a good thing. It's easier to cheat because it's so easy to talk to people. This is especially true if the teacher isn't watching what the students do on the computer. All it takes is one group email to send out the answers to a quiz or test. One easy way to deal with this problem is to give students tasks that need their own unique point of view.[205] Encouragement of thought rather than memory generally lessens the desire to cheat. One in every five children in the United States (US) lives in a family where there is no regular food security. The incorporation of contemporary technologies into their life comes second. It's preferable to have a pantry full of vital goods than a new iPhone in your pocket. To be a successful learning tool, schools must give equitable access to technology to all students. Barriers to free resources, such as computer access at a library, must be removed. This problem can only be solved through sharing.[206] There is a lot of good stuff that can be found on the internet today. There is also a lot of misleading and outright false data that can be found as well.[207] Students must learn how to identify a quality information source from something that might be labeled as 'fake news.' Drawing opinions on questionable content could put students at a disadvantage when it comes time to carve out a spot for them with the rest of society.[208] Even though firewalls and site blockers can keep kids from seeing most of the harmful content online, some parents go even further and only let their kids do simple research and word processing on the computer. Students are given homework at home that tells them to use technology on their own, at the library, or through a loan program. This is done so that parents don't have to do it.[209] If we force limits on children instead of teaching them how to make wise choices, then is that really giving them a learning environment?[210]

Many software learning tools like apps provide teaching mechanisms within the program itself. With a program like ABC Mouse, students can interact with a programmed online teacher as they complete learning lessons. That forces the teacher into a role of observer or manager.[211] Teachers may never become obsolete, but technology in the classroom can replace much of what they have done in the past already.[212] That implies that rather than building a tailored curriculum to apply, the future of education may lay in being active in the development of new technologies. Not everyone understands how to use the current technologies that help instructors stay organized. Learning how to utilize a new tool can be just as difficult as completing a difficult program to acquire a teaching degree or certification in the first place.[213] Some school systems might not even help pay for these tools, but they still expect to see them in the classroom. In other words, the teacher doesn't get paid extra for these things. Having a conversation with someone online is very different from having a conversation with them in person. Once someone thinks they can be private, they start to lose control over what they say and do. For the ease of a screen, words, and images, some people even stop talking to other people in real life.[214] That is why technology should be used as a tool in the classroom. It cannot be the only component of the learning process for students.[215] If student cannot recall a piece of information instantly, then what is their next step to find an answer? Most people would say that they would look online for the data they want or ask a

[203]Granata K, (2019),Tech May Be to Blame for Decline in Students' Reading for Pleasure: Education World. Available: https://www.educationworld.com/a_news/technology-proves-negatively-effect-reading-skills,

[204]Vie, Stephanie (3 July 2017), "Training Online Technical Communication Educators to Teach with Social Media: Best Practices and Professional Recommendations", Technical Communication Quarterly, 26 (3): 344–359. doi:10.1080/10572252.2017.1339487. ISSN 1057-2252, accessed on 28 Aug 2023

[205] Johnson M et al, (1999), Technology as a change agent for the teaching process. Theory into Practice, 38(1), 24-30, accessed on 29 Aug 2023

[206] LeBlanc A G et al, (2015), Correlates of Total Sedentary Time and Screen Time in 9–11 Year-Old Children around the World: The International Study of Childhood Obesity, Lifestyle and the Environment, PLoS ONE, 10 (6), accessed on 29 Aug 2023

[207]Şad S et al, (2014), Preservice teachers' perceptions about using mobile phones and laptops in education as mobile learning tools, British Journal of Educational Technology, 45(4), 606-618, accessed on 29 Aug 2023

[208]Kaplan, Andreas (6 April 2021). Higher Education at the Crossroads of Disruption: the University of the 21st Century. ISBN 978-1-80071-504-2, accessed on 29 Aug 2023

[209] Fried, C. B., (2008), In-class laptop use and its effects on student learning, Computers & Education, 50(3), 906- 914, accessed on 28 Aug 2023

[210]Verzosa Hurley et al, (January 2014), "The Rhetoric of Reach: Preparing Students for Technical Communication in the Age of Social Media", Technical Communication Quarterly. 23 (1): 55–68, accessed on 28 Aug 2023

[211]Nneji B. U. et al, (2014), Technologies in education and the dehumanization and imperialization of pedagogy: The African perspective. Bulgarian Journal of Science and Education Policy, 8(1), 86-105, accessed on 29 Aug 2023

[212] https://www.dejaoffice.com/blog/2020/10/28/7-disadvantages-of-technology-in-education/, accessed on 29 Aug 2023

[213]Lowerison G et al, (2006). Student perceived effectiveness of computer technology use in post-secondary classrooms. Computers & Education, 47(4), 465-489, accessed on 29 Aug 2023

[214] https://www.smartprix.com/bytes/a-guide-to-emojis-types-of-emojis-what-do-they-mean-how-to-use-them/, accessed on 29 Aug 2023

[215]Haßler B et al, (2015). Tablet use in schools: A critical review of the evidence for learning outcomes. Journal of Computer Assisted Learning, 32(2), 139-156, accessed on 29 Aug 2023

virtual assistant, like Alexa, to give them the answer.[216] It is good to have access to a treasure mine of resources, but their existence may also foster reliance. If we do not educate children how to retain information without the help of a smart device or computer, the future generation of pupils may be unable to function unless they have access to technology.[217] Encouraging the use of tech might help to create more learning opportunities, but it can also lead to a lifestyle that is more sedentary.[218] When children sit for too long during the day, then they face the same health challenges that adults do when not getting enough exercise. There can be problems with obesity, hyperactivity, muscle fatigue, sleeping problems, and metabolism issues with prolonged sitting.[219] That's why any school that brings technology into the classroom should also try to get students to do some mild physical exercise every day.

Theft of identities is a big problem these days. In the United States in 2016, about US\$ 16 billion was stolen from 15.4 million people. Javelin Strategy and Research says that between 2011 and 2016, identity thieves took more than US\$ 107 billion from people. Every day, students' privacy is at risk when they use high-tech tools.[220] There are risks in this area that can't be fully eliminated, even though most apps and software have strict privacy settings. When you watch something on a computer screen, a smartphone screen, or a tablet screen, it can hurt your eyes. Some of the signs that this is happening are eye discomfort, tiredness, and even blurred vision. CBS News reports that kids who use computers a lot are more likely to develop nearsightedness early in life. Now, nearly 60% of kids aged 12 and up have myopia.[221]Children are uniquely adaptable to changing environments. What they see is what they think is normal, even if what they see is problematic. That includes more than just their eyesight.[222] Children often lose track of time when they are using a device with a screen. This leads to prolonged periods of sitting, which could lead to hyperactivity, obesity, and other issues.[223] Moreover, it has the potential to disrupt the child's sleep habits by causing a detachment from their inherent circadian cycle. Once again, the integration of technology inside educational settings is frequently constrained to fulfilling word processing requirements or facilitating rudimentary research tasks. The diverse applications of contemporary technology are frequently subject to restrictions or limited access, mostly due to political or individual motivations. The constraints imposed on technology usage have a detrimental impact on its efficacy and result in unfavorable modifications to pupils' learning prospects.[224] Technology can provide access to a vast amount of data, but it can also create a personal dependence upon that access.[225] Students using technology every day might feel offended by the idea of picking up a real book to read. They might even resist going outside for recess or to participate in family activities.[226]

Technology Can Helps Student in Many Ways

Technology helps students access to information and resources. Technology provides students with instant access to a vast amount of information and resources. The internet and digital tools allow students to explore various subjects, conduct research, and access educational materials that may not be available in traditional textbooks.[227] In real life, there are many ways that students can use technology to help them learn. Online databases and digital libraries give students access to a wide range of academic and study materials that can help them learn. These include e-books, educational papers, journals, and multimedia content. Learning management systems (LMS) and educational tools make it easy for teachers to share materials and give students access to information. Digital textbooks, multimedia material, engaging lessons, and homework can all be stored on these sites. Open Educational Resources, or OER, are 21st century educational tools that can be found online for free. Open Educational Resources (OER) sites let teachers find textbooks, lesson plans, videos, and other materials that fit with the lessons and give students extra sources of knowledge. Everyone knows that when students do research projects, they have to go to the library to get a few books to read, a thesaurus, and even microfilm to

[216]KimmeHea et al, (January 2014), "Social Media in Technical Communication", Technical Communication Quarterly, 23 (1): 1–5. doi:10.1080/10572252.2014.850841, ISSN 1057-2252,S2CID 219641115, accessed on 28 Aug 2023

[217]Bowdon, Melody A. (1 January 2014), "Tweeting an Ethos: Emergency Messaging, Social Media, and Teaching Technical Communication", Technical Communication Quarterly, 23 (1): 35–54. doi:10.1080/10572252.2014.850853. ISSN 1057-2252, accessed on 28 Aug 2023

[218] Flanagan J. L. et al, (2008), Technology: The Positive and Negative Effects on Student Achievement. NY: University of New York, accessed on 28 Aug 2023

[219]Friess Erin et al, (October 2018), "Cultivating a Sense of Belonging: Using Twitter to Establish a Community in an Introductory Technical Communication Classroom", Technical Communication Quarterly. 27 (4): 343–361, accessed on 28 Aug 2023

[220]Baker, Celia (4 January 2013). "Blended learning: Teachers plus computers equal success", Desert News, Archived from the original on 23 October 2013, accessed on 29 Aug 2023

[221] Nye D. E. et al, (2006), Technology Matters: Questions to Live with, The MIT Press, accessed on 29 Aug 2023

[222] Purcell K et al, (2013), The Impact of Digital Tools on Student Writing and How Writing is taught in Schools: Pew Research Center. Available: https://www.pewinternet.org/2013/07/16/theimpact-of-digital-tools-on-student-writing-and-how-writing-is-taug, accessed on 29 Aug 2023

[223]Unesco (5 March 2020). "Distance learning solutions". Archived from the original on 31 March 2020, accessed on 29 Aug 2023

[224]Technology in Schools: Weighing The Pros And Cons". Huffington Post. 25 May 2011. Archived from the original on 23 April 2014, accessed on 29 Aug 2023

[225]Rosenberg, Richard (2004), The Social Impact of Computers. Amsterdam: Elsevier Academic Press. p. 219, ISBN 978-0-12-597121-8, accessed on 29 Aug 2023

[226]As Schools Close Over Coronavirus, Protect Kids' Privacy in Online Learning", Human Rights Watch. 27 March 2020. Archived from the original on 10 April 2020, accessed on 29 Aug 2023

[227] https://explorance.com/blog/7-reasons-students-need-technology-classroom/#, accessed on 24 Feb 2023

look at. This gives them all the tools they need to finish their work.

Technology connects the classroom experience to the real world. Technology allows educators to remove the physical barriers of the classroom, offering students a way to connect the curriculum with the real world and those areas of academic focus that can genuinely enrich the student experience.[228] A geology professor, for example, conducts her pupils on a virtual tour of the Grand Canyon National Park. A history instructor takes his students on a tour of the White House's halls and history. Virtual guest speaker sessions may also be facilitated by technology, allowing students to engage with experts and professionals from many sectors via video conferencing, increasing their access to knowledge and real-world viewpoints. Students utilize technology in all parts of their life outside of the classroom. Technology in the classroom may make learning more enjoyable and fascinating. Here are some creative ideas for incorporating technology into classroom activities. In the twenty-first century, technology enables students to use educational gaming websites or apps that provide interactive quizzes, puzzles, and challenges relevant to the subject matter. This keeps pupils entertained and competitive while reinforcing their learning.[229]

Technology can prepare students for the modern workplace. Students need more than just a basic understanding of today's technology in order to do well in the workplace of the 21st century. Students need to learn how to use the tools and skills they will probably find in the modern workplace. Schools make sure their students are ready for the job market in more than one way by using these tools in routine lessons and activities.[230] Digital literacy skills are in high demand in the workplace.[231] Students learn to navigate digital platforms, use productivity tools, interact online, and effectively communicate through digital mediums by incorporating technology into the classroom. Students may use technology to obtain, organize, and analyze vast volumes of data. Employees are frequently required to collect data and do research in order to make educated judgments. Students become acquainted with information management tools and processes in the classroom, preparing them for these jobs. Students are exposed to a variety of digital tools and platforms through technology integration. This experience helps students become adaptive and versatile in their use of various technologies, as employers in the twenty-first century frequently ask employees to learn and adapt to new technologies and applications.

Technology encourages collaboration, communication, creativity and Innovation. Technology can help students make multimedia slideshows, plan projects, build prototypes, and come up with new ways to say what they think. In many fields, where creative problem-solving and new ideas are needed, these skills are highly valued. A lot of teaching tools have different features that make it easier for people to work together. Users of videoconferencing apps like Zoom, Microsoft Teams, Slack, and Skype can hold virtual talks with friends from anywhere in the world. Students can quickly share and update projects with each other using free online storage services like Google Drive. This makes it easier for people to work together in both

school and the workplace. This mirrors the teamwork and communication skills required in any workplace in 21st century.

Technology allows global awareness and cultural exchange. Technology allows students to connect with peers and experts from around the world. Through video conferencing, online collaborations, and virtual exchange programs, students can gain global awareness, learn about different cultures, and develop a broader perspective on various issues. No two kids learn in the same manner, but with the correct tools, instructors may accommodate differences in learning styles and experiences. In the twenty-first century, a Student Insight Solution platform such as Explorance Blue can assist in identifying student requirements based on real-time input. Explorance Blue promotes student learning by enabling teachers to interact and engage with every student, regardless of where they are, what they do, their culture/beliefs, or their obstacles.

[228]Kemp Nenagh et al, (1 January 2014), "Face-to-face or face-to-screen?, Undergraduates' opinions and test performance in classroom vs. online learning", Frontiers in Psychology. 5: 1278, accessed on 30 Aug 2023

[229]Clark, R C et al, (2007), eLearning and the Science of Instruction, San Francisco: Pfeiffer. ISBN 978-0787986834, accessed on 30 Aug 2023

[230]Kronholz J., (2011), "Getting at-risk teens to graduation", Education Next, Vol. 11, no. 4, accessed on 30 Aug 2023

[231] Richards J. C. et al, (2010). Longman Dictionary of Language Teaching and Applied Linguistics (4th ed). London: Pearson, accessed on 30 Aug 2023

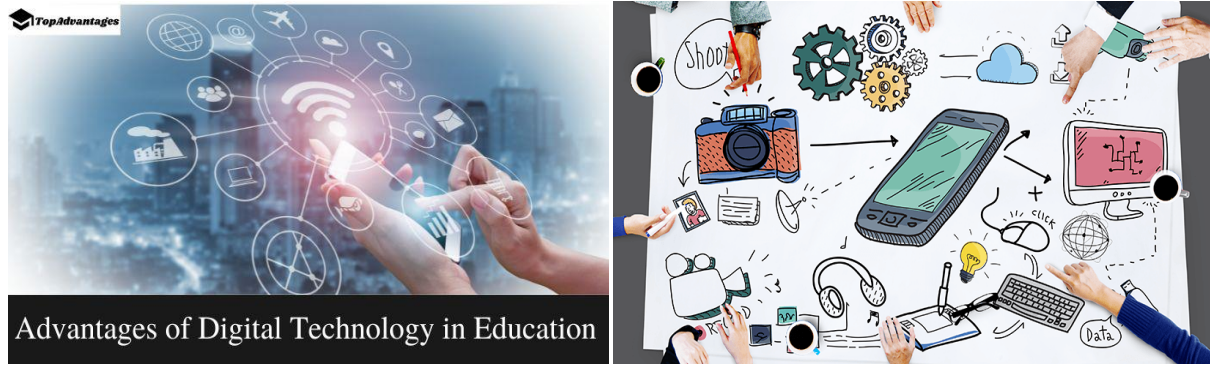*Figure 9: Advantage of technology in education[232] and technology benefits learning[233]*

Technology teaches students to become digital citizen. There are so many social networking sites that most kids are already digital citizens. But kids can learn how to be responsible in the digital world and with their digital activities if technology is used in the classroom. Students can practice talking to, finding, and interacting with other digital citizens in class, which becomes a small version of the larger digital world.[234] It enables students to collect student input, conduct class surveys, and stimulate class discussions by utilizing online polling tools or survey platforms. This promotes active involvement and allows pupils to express themselves. It also assists students in the introduction of coding and programming activities through the use of instructional coding platforms or applications.[235] Students can learn the basics of coding through game-based tutorials and then apply their skills to create simple programs or animations in 21st century.

Technology helps students to become smart citizen. Effective teachers use technology to improve their lessons and get their students more involved. However, it's important to make sure that kids know how to search for information, evaluate sources seriously, and use technology safely. Teachers are very important for helping kids learn how to use technology and find knowledge.**[236]** It assists students in becoming focused and learning smart technologies such as Artificial Intelligence (AI), Machine Learning (ML), Big Data, Reality (AR), Virtual Reality (VR), and so on. Students may now experiment with AI, machine learning, augmented reality, and virtual reality technologies to create immersive and interactive learning experiences. AR/VR tools may be used by students to tour historical locations, dissect virtual creatures, and visualize complicated topics in three dimensions. In the twenty-first century, students may utilize AI/ML technologies or applications to learn and gain knowledge from anywhere in the globe.

Technology can create problem for student in many ways deterioration of students' competencies in reading, writing and arithmetic. Those are the three basic skills any student is expected to master.[237] In general, technology in the classroom helps students do better in school and motivates them to finish their work. A lot of time spent on technology seems to make it harder for kids to do three skills that are clearly important to them: reading, writing, and math.[238] Students do not learn as much from Google Books as they do from traditional books and periodicals. Similarly, criticizes technology of making our thoughts "shallow" and claims that kids who read linear texts have higher comprehension and recall than those who read over the Internet. The transition from paper to screen alters more than simply how we read a piece of text.[239] It also influences the degree of attention we devote to it and the depth of our immersion in it. When we go online, we enter an environment that promotes cursory reading, hurried and distracted thinking, and superficial learning.[240] Classroom technologies drastically affect students' ability to write, notably when it comes to spelling and punctuation, grammatical accuracy, spelling, proofreading, critical thinking, respect of coherence and linearity. Constant exposure to short forms cripples' students' ability to splash out effort in writing and that the short forms that are frequently used in texting makes it daunting for them to distinguish formal

[232] https://topadvantagesof.com/11-advantages-of-digital-technology-in-education/, accessed on 01 Aug 2023

[233] https://elearningindustry.com/technology-benefits-learning, accessed on 01 Aug 2023

[234] Deschaine Mark et al, (2017), "Increasing Student Engagement in Online Educational Leadership Courses" (PDF). Journal of Educators Online: 6. Archived (PDF) from the original on 31 December 2018, accessed on 31 Aug 2023

[235] Izadpanah, S., (2016), The perception of EFL high school students in using of computer technology in the process of learning: Merits and demerits. Advances in Language and Literary Studies, 7(3), 146- 156, accessed on 31 Aug 2023

[236] Su Jiahong et al, (24 May 2023), "Teaching artificial intelligence in K–12 classrooms: a scoping review". Interactive Learning Environments: 1–20, accessed on 31 Aug 2023

[237] Bishop J., (2013), The flipped classroom: A survey of the research. 120th ASEE National Conference Proceedings, 30, pp. 1-8. Atlanta, GA, accessed on 31 Aug 2023

[238] Al-Hariri M, (2017), Impact of students' use of technology on their learning achievements in physiology courses at the University of Dammam, Journal of Taibah University Medical Sciences, 12(1), 82-85, accessed on 31 Aug 2023

[239] Clarke B., (2014), An updated literature review on the use of tablets in education. Tablets for Schools, UK: Family Kids & Youth, accessed on 31 Aug 2023

[240] Carr, N. (2011). The Shallows: What the Internet Is Doing to Our Brains. New York: W. W. Norton & Company, accessed on 31 Aug 2023

conventions of writing from informal ones.[241] When it comes to the fields of mathematics and arithmetic, the utilization of technology in educational instruction presents a plethora of possible problems that may be considered embarrassing. Calculators often include a numerical orientation, which may hinder pupils from developing a robust mental comprehension. It is likely that their perspective on mathematics will exhibit a greater emphasis on procedural aspects, thereby leading to potential limitations in their problem-solving abilities. The utilization of technological instruments in the 21st century may impede the formation of individuals' structural perspective on mathematics. Furthermore, due to its nature, a calculator has the potential to provide inaccurate data and generate cognitive dissonance when it comes to understanding mathematical language.[242] In 2012, the UK government announced its intention to ban calculators in primary schools because students use them too much.[243]

Dehumanization of education. In many contexts, technology dehumanizes education and distorts the interaction between teachers and pupils. Teachers give their lectures from a distance in higher education institutions and online courses, for example, and students are obliged to engage with robots rather than humans. As a result, the instructor knows nothing or very little about his or her pupils, and the students have no intimate contact with their teacher. Technology is now drawing students away from their actual surroundings. They truly tune out the rest of the world. College students are now accustomed to a world of electronic footprints left by online blogging, instant messaging, and Web surfing.[244] Dependence on technology in the classrooms also entails the lack of rapport between teachers and students and/or among students themselves; which leads to eroding the social relationships involved in teaching, thereby eroding one of the main aims of education.[245] If teachers depend on technology for a long time in the classrooms, there is hardly any time for them to have any impact on their students in 21st century. In the same fashion, students do not have the opportunity to develop sound relationships with one another.[246]

Isolation of students in a digital and virtual world. Technology makes it harder for students to connect with others in any way. Psychoanalytic Theory says that people isolate themselves as a way to protect themselves when they are in a situation that they find scary or unpleasant. Because of this, students who use technology a lot start to feel safe and secure when they are "wired" to their devices and avoid all social ties that could get them separated. Paul and Brier came up with the word "friend sickness" in 2001 to describe how lonely college students feel when they leave their old school friends behind.[247] They pretend that technology bridges that gap in relationships and provides those young students with the impression that those friendships have not faded away.[248] Drawing attention to the risk of technology-enhanced isolation and the harmful effects it may have on children's social development, the author says, "The fact that a computer is usually placed in a person's room instead of a family room and that a child uses it alone, without any other family members being there, raises concerns about social isolation and their negative effects on their social development." Turkle (2011) highlights the dichotomous effect of technology when it divides its users between the illusory illusion of companionship on the one hand and the terrifying reality of solitude on the other. "We easily find 'company' online, but are exhausted by the pressure of performance," she says.[249] We enjoy continual connection but rarely have each other's attention." This feeling of isolation often results in a feeling of loneliness and is greatly related to the dehumanizing effect of technology. In 2013, Karsenti and Fievez evoke the case of Quebec children being distracted due to the excessive reliance on tablets in learning in 21st century.[250] The repetitive use of technology-based games and entertainment, in a bid to render the lessons more appealing, entails students' isolation, and could finally lead to poorer outcomes of learning.[251] Distraction can also be added to the technical problems accompanying the use

[241]Bronowicki, K. A. (2014). Technology's adverse effects on students' writing: An emphasis on formal writing is needed in an academic curriculum. Master's Thesis: State University of New York, accessed on 31 Aug 2023 Available:https://digitalcommons.brockport.edu/cgi/viewcontent.cgi?referer=https://www.google.com.eg/&h ttpsredir=1&article=1399&context=ehd_theses, accessed on 31 Aug 2023

[242]Zheng T., (1998), Impacts of using calculators in learning mathematics, The 3rd Asian Technology Conference on Mathematics (ATCM'98), 1-10. Available: http://www.any2any.org/EP/1998/ATCMP015/paper.pdf, accessed on 31 Aug 2023

[243] Stacey, O. (2014, November). Subtracting calculators from maths tests doesn't add up. Available: https://thenferblog.org/2014/11/12/subtracting-calculators-from-maths-tests-doesnt-add-up/, accessed on 31 Aug 2023

[244] Spitzer M., (2014), Information technology in education: Risks and side effects. Trends in Neuroscience and Education, 3(3-4), 81-85, accessed on 31 Aug 2023

[245]Nneji, B. U. (2014). Technologies in education and the dehumanization and imperialization of pedagogy: The African perspective. Bulgarian Journal of Science and Education Policy, 8(1), 86-105, accessed on 31 Aug 2023

[246] Nicholas, C., et al, (2010), Overcoming isolation in distance learning: Building a learning community through time and space. Journal for Education in the Built Environment, 5(1), 27-64, accessed on 31 Aug 2023

[247] Paul, E. et al, (2001), Friendsickness in the Transition to College: Precollege Predictors and College Adjustment Correlates. Journal of Counseling and Development, 79(1), 77-89, accessed on 31 Aug 2023

[248] Lee S. J. (2009). Online Communication and Adolescent social Ties: Who Benefits more from Internet Use? Journal of Computer-Mediated Communication, 14(3), 509-531, accessed on 31 Aug 2023

[249]Turkle S., (2011), Alone Together: Why we Expect more from Technology and less from Each Other. New York: Basic Books, accessed on 31 Aug 2023

[250]Karsenti, T., &Fievez, A. (2013), TheiPad in education: Uses, benefits and challenges. A survey of 6,057 students and 302 teachers in Quebec, Canada, Montreal: CRIFPE, accessed on 31 Aug 2023

[251]Iserbyt, P. C. (2014). Learning basic life support (BLS) with tablet PCs in reciprocal learning at school: Are videos superior to pictures? A randomized controlled trial, Resuscitation, 85, 809-813, accessed on 31 Aug 2023

of tablets by young students, even in the case of completing simple tasks such as gap filling and matching, especially if there is no technical support available to deal with those problems in a prompt way.[252]

Technology creates and deepening social inequalities. The gap between students who can afford technology and those who can't is growing between those who do and those who don't. There is a big gap between the rich and the poor because of technology. The infrastructure of schools in wealthy and emerging countries is very different from one another. Most schools in developed countries have computers, laptops, tablets, projectors, and Internet connection. Most schools in poor countries, on the other hand, don't have any of these things.[253] Thus, students in developing countries graduate with limited basic technological skills like PC literacy and face huge problems to find a well-paid job, or find it too difficult to compete in the global market. Even in developed countries, there is usually a digital divide as there is a big difference between students coming from different social backgrounds.[254] Poor children may have access to technology in the classroom but cannot buy any device at home, as seen by their academic success when compared to their wealthy friends. According to a National Telecommunications and Information Administration (NTIA) assessment, city dwellers in the United States are 50% more likely to have Internet connection than those living in rural regions.[255] A comment by Sarah Phinney, the distance learning coordinator at Porterville Adult School in Central California, shows the results of this digital divide as follows: In my seven years' experience working with this population [at Porterville Adult School], I have found that a great number of the students we serve, especially those who speak English as a second language, are computer illiterate and thus are on the lean side of the divide.[256] If this is the result of the digital divide in the US, it must be much worse and bigger in other countries where the divide is bigger, like in LDCs (less developed countries) where private schools and universities have better access to working technology than public schools and universities. This is shown by the fact that graduates from these two types of schools have very different levels of knowledge in the 21st century.[257]

Emotional and behavioral issues. Children may have an overwhelming desire to emulate their heroes or peers. When they can't meet up or do what they observe on TV, it can cause worry or a sense of inadequacy and inferiority.[258] FOMO (Fear of Missing Out) emerges, a toxic combination of worry and inadequacy. The online world can be a breeding ground for hate. The internet provides an opportunity for children to be emotionally plagued in 21st century.[259] Children and teenagers can use technology and social media to bully other kids without even meeting them. This behavior is commonly referred to as cyberbullying in 21st century.[260] It is common even with younger students.[261]

[252]Culén A, et al, (2012), Tweens with the iPad classroom – Cool but not really helpful, International Conference on e-learning and e-technologies in education (ICEEE), (pp. 1-6). Technical University of Lodz, Poland, accessed on 31 Aug 2023

[253]Kemp Nenagh et al, (1 January 2014), Face-to-face or face-to-screen?, Undergraduates' opinions and test performance in classroom vs. online learning", Frontiers in Psychology, 5: 1278. doi:10.3389/fpsyg.2014.01278, accessed on 31 Aug 2023

[254] Van Dijk, J, (2011),The digital divide as a complex and dynamic phenomenon, The Information Society: An International Journey, 19(4), 315-326, accessed on 31 Aug 2023

[255] Steele-Carlin S., (June 2017), Caught in the digital divide, Education World, Available: http://www.education-world.com/a_tech/tech041.shtml, accessed on 31 Aug 2023

[256]Tapscott D. (1999), Growing up Digital: the Rise of the Net Generation. New York: McGraw-Hill,

[257]Warschauer M., (2011), Dissecting the "digital divide": A case study in Egypt. The Information Society: An International Journal, 297-304, accessed on 31 Aug 2023

[258] Wallace, K. (2009, June 17), High-Tech Cheating on the Rise at Schools, Cbsnews. Available: https://www.cbsnews.com/news/high-tech-cheating-on-the-rise-at-schools/, accessed on 31 Aug 2023

[259]Rideout, V.; Vanderwater, E.; Wartella, E. (2003), Zero to six: Electronic media in the lives of infants, toddlers, and pre-schoolers (Report), Menlo Park, California: The Henry J. Kaiser Family Foundation. Archived from the original on 24 December 2014, accessed on 31 Aug 2023

[260]Kester, Liesbeth; Kirschner, Paul; Corbalan, Gemma (May 2007), "Designing support to facilitate learning in powerful electronic learning environments", Computers in Human Behavior, 23 (3): 1047–1054, accessed on 31 Aug 2023

[261]Craft Anna, (July 2012), "Childhood in a digital age: creative challenges for educational futures" (PDF). London Review of Education, 10 (2): 173–190, accessed on 31 Aug 2023

Reduced sleep quality. Because of portable devices like smart-phones and tablets, children now have access to media content at any time of day. It implies that people may spend the entire night reacting to texts and messages instead of sleeping.[262] Sleep is necessary for physical and mental health, and children need a lot of sleep.[263] A good night's sleep aids development, improves heart health, influences weight, boosts attention span, and even aids in study. Misuse and a lack of understanding of how much technology is 'too much' are two of technology's disadvantages. Ensure that anybody supervises and limits their children's use of technology in the twenty-first century.[264]

Figure 10: Disadvantage of *technology in education and technology become addiction*

Reduced physical activity. When kids use technology too much, it can cause health problems that can have very bad effects. People who spend more time on their phones, playing computer games, or watching TV are less likely to be busy generally. A lifestyle that is less healthy is encouraged by more people using technology.[265] It may lead to several health issues, including obesity, coronary heart disease, and diabetes type 2. Children who spend more time on a screen spend less time outside or partaking in physical activities.[266] They may also engage in more mindless eating when watching TV or playing video games.[267] That is why it is necessary to understand some strategies to get kids to eat without gadgets. Pediatricians or registered dietitians can offer guidance on healthy eating habits and physical activity, monitor growth and development, while parents can promote a healthier lifestyle by encouraging outdoor activities, limiting screen time, and providing healthy snacks.[268] Taking proactive steps tomanage obesity can help children achieve optimal health and avoid long-term health issues in 21st century.[269]

[262]Vonberg J., (2015, December 8), The loneliness of the long distance learner, The Guardian, Available: https://www.theguardian.com/higher-education-network/2015/dec/08/you-work-in-a-vacuum-theloneliness-of-the-long-distance-learner, accessed on 31 Aug 2023

[263]Cuesta Cambra et al, (1 July 2017), "The Cognitive Processing of an Educational App with EEG and 'Eye Tracking'", Comunicar, 25 (52): 41–50. doi:10.3916/c52-2017-04, accessed on 03 Sep 2023

[264]"Guiding Principles for Use of Technology with Early Learners", Office of Educational Technology, Archived from the original on 6 November 2018, accessed on 03 Sep 2023

[265]Biocchi Michael, "Games in the Classroom", Gaming in the Classroom. Archived from the original on 15 August 2011, accessed on 03 Sep 2023

[266]Schindler, Laura A.; Burkholder, Gary J.; Morad, Osama A.; Marsh, Craig (December 2017). "Computer-based technology and student engagement: a critical review of the literature", International Journal of Educational Technology in Higher Education, 14 (1): 25. doi:10.1186/s41239-017-0063-0. ISSN 2365-9440, accessed on 03 Sep 2023

[267]"Technology in the Preschool Classroom", study.com, Archived from the original on 6 November 2018, accessed on 03 Sep 2023

[268] Publications, "The Rise of Cyber-Schools", The New Atlantis, Archived from the original on 25 February 2013

[269]Viorica-Torii, C., & Carmen, A. (2013), The impact of educational technology on the learning styles of students. Procedia-Social and Behavioral Sciences, 83, 851-855, accessed on 03 Sep 2023

Weakened social skills. Children of the new generation play online games, access websites and communicate on Facebook. Continuous use of technological devices can restrict the development of basic interaction skills.[270] Social skills know when to take turns in discussions, reading and using facial expressions, and making good eye contact. It's not that spending time online is awful. But too much time online can sever the bond between parents and children and inhibit kids' development of social skills.[271]So, technology can positively benefit children along with too much exposure can have harmful consequences in 21st century. These are less likely to occur if student minimize their screen time. Stick to their pediatrician's advice and their best judgment of a balanced day for child. Supervise their social time, screen time, and physical activity. The key to parenting is balance, moderation, and supervision.[272]

New experiences can feel and seem scary. Because the brain prefers what it is acquainted with, we frequently feel at ease in familiar settings. So, it's no surprise that technology may be blamed for many of the problems we face as a society. We are frequently cautious or terrified of technology since it moves so quickly and may seem so strange owing to the pace of advancement and invention. It is natural to be afraid of the unknown and uncomfortable with new things, yet technology facilitates new experiences.[273] For as long as there has been technology, there have been those warning against it. From radios and TVs to the internet and social media, technology has forced us to adapt to new and unknown worlds.[274] How much time do student spend in front of screens each day? The average screen time, by age, can be surprising for most people. People spend numerous hours each day in front of smart-phones, laptops, tablets and other devices for school, work, and recreation.[275] Most people feel some guilt about the amount of time they spend looking at screens throughout the day.[276]

Some Suggested and Recommendation

Today, technology is used in a lot of different ways in schools. All over the world, modern technology has grown very quickly, which has had a big impact on how students learn and how teachers teach. A school's level of success is often judged by how much technology it uses in the classrooms.[277] As a result, technology has had a significant impact on students' social and educational life, which naturally generates concerns about the repercussions of its usage. According to the Association for Educational Communications and Technology (AECT), educational technology is the research and ethical practice of enhancing learning and increasing performance via the development, use, and management of suitable technological processes and resources. So, the definition of technology includes not just 'TECHNOLOGY' such as the internet or computer, but also the application of scientific knowledge to improve learning.[278]Actually, no one contests that removing technology from the classroom is practically impossible in 21st century.[279] Yet limiting its negative effects is still at our reach. UNICEF (2017) advises technology users to 'Harness the good." and "limit the harm." [280] A list of suggestion/recommendations on how to handle technology in a way that would not be threatening to students in 21st century has been given below.[281]

➢ Making sure learners to interact with each other even when immersed in their digital world.[282]We should include visualization tools in student tracking technologies which allow teachers to easily interpret student progress.

➢ Technology should be used as to facilitate Teaching and Learning. Devising activities which necessarily promote communication and collaboration.[283]

➢ Sharing and comparing (blog posts, classroom projects, etc) to see how technology can connect learners all around the world.[284]

[270] Steele-Carlin S, (2017, June), Caught in the digital divide, Education World, Available: http://www.education-world.com/a_tech/tech041.shtml, accessed on 03 Sep 2023

[271] Stacey, O. (2014, November). Subtracting calculators from maths tests doesn't add up. Available: https://thenfer-blog.org/2014/11/12/subtracting-calculators-from-maths-tests-doesnt-add-up/, accessed on 03 Sep 2023

[272]https://www.cyberwise.org/post/positive-and-negative-effects-of-technology-on-children, accessed on 26 Augy 2023

[273] "Technology in Schools: The Ongoing Challenge of Access Adequacy and Equity" (PDF), NEA Education Policy and Practice Department, Archived from the original (PDF) on 25 October 2019, accessed on 03 Sep 2023

[274]https://www.cyberwise.org/post/from-social-media-to-smartphones-how-technology-affects-our-mental-health, accessed on 31 Aug 2023

[275]Kronholz, J., (2011), "Getting at-risk teens to graduation", Education Next, Vol. 11, no. 4, ProQuest 1237831598,

[276] https://www.igi-global.com/article/learning-object-models-learning-service/1666, accessed on 03 Sep 2023

[277] Stacey, O. (2014, November). Subtracting calculators from maths tests doesn't add up. Available: https://thenfer-blog.org/2014/11/12/subtracting-calculators-from-maths-tests-doesnt-add-up/, accessed on 03 Sep 2023

[278]https://www.researchgate.net/post/Confusion_over_the_Concept_of_Educational_Technology, accessed on 11 Sep 2023

[279] Shiao, Dennis. "Why Virtual Classrooms Are Excellent Learning Venues", INXPO, Archived from the original on 5 November 2013, accessed on 03 Sep 2023

[280] UNICEF Report (2017). The State of the World's Children 2017: Children in a Digital World. Available: https://www.unicef.org/publications/files/SOWC_2017_ENG_WEB.pdf (June 14, 2019), accessed on 03 Sep 2023

[281] Wilkins, K. (2014, May). How New Technologies Affect Student-Teacher Relationships. British Council Voices Magazine, Available: https://www.britishcouncil.org/voices-magazine/new-technologies-affect-studentteacher-relationships, accessed on 03 Sep 2023

[282] Wentworth D. et al, (2014), Technology use and academic performance, Computers & Education, 78, 306-311, accessed on 03 Sep 2023

[283]Warschauer M., (2011), Dissecting the "digital divide": A case study in Egypt. The Information Society: An International Journal, 297-304, accessed on 03 Sep 2023

[284]Serbyt, P. C., (2014), Learning basic life support (BLS) with tablet PCs in reciprocal learning at school: Are videos superior to pictures? A randomized controlled trial, Resuscitation, 85, 809-813, accessed on 03 Sep 2023

➢ Encouraging tech-savvy students to design interactive content that would enrich the course.[285]There should be professional development efforts toward those which emphasize the use of technology in instruction, rather than for administrative tasks.

➢ Provide teacher training by highlighting constructivism and student-centered education. Involve teachers in the decision-making process when adopting new technologies in education is essential.[286]

➢ Teacher training may also be another springboard whereon to stand when seeking to guarantee the appropriate use of technology.[287] In fact, the more training teachers receive, the better way technology would be used and the less negative effects it would entail.[288]

➢ Technology-based devices would not be effective unless their use is accompanied by appropriate pedagogical approaches.[289]

➢ Surprisingly inserting technology in teaching will not have the expected added value unless objectives are clearly set and tasks are well-designed.[290]In 21st century, teachers generally appreciate the benefits of educational technologies, they often find smooth and effective integration of new educational technologies challenging. From acquisition of new technology equipment to adaptation of curricula and teaching techniques to incorporate new educational tools, technology integration presents significant challenges to educators at each level of school systems.[291]

➢ Technology is perhaps the strongest factor shaping the educational landscape in 21st century. We should use appropriate technology for teaching and learning process, educational administration, educational management, educational evaluation, etc.[292]

➢ Educational systems are now required to ensure that integrating ICT programs in the curriculum should be supported by effective Continuing Professional Development (CPD) programs for instructors wherein technology-based learning is incorporated. Parents should also be made aware that technology is not a blessing all the time, and that it is now their own priority to harness that strong drive among their offsprings to use technology everywhere and at any time.[293]

➢ Actually, computer was not developed for the management, it was developed for the calculation and simulation and today we see that it is used in every aspect. So, our mind set and attitude to use and take help from technology will make us beneficial.[294]

➢ Technological pedagogical knowledge (TPK) requires more than knowing useful pedagogical or academic techniques and familiarity with technologies; it requires an understanding of how particular technologies can provide support for particular pedagogical strategies or techniques. Technological pedagogical content knowledge (TPACK) additionally requires an understanding of how technologies can support pedagogies for specific domains.[295]

➢ Research on the brain has shown that the simple act of writing by hand has slowing and stimulating effects that help people learn and remember things. Typing is fast, but it is boring because each keystroke is almost the same.[296] Writing by hand is harder more complicated, and takes more time. This makes it easier for learner brain to form more 'hooks' to hold on to ideas.[297]

➢ Students can also get around a school firewall by using a virtual private network (VPN) to encrypt their browsing data so that their activities on the internet can't be tracked.[298]

[285] Bishop J. et al, (2013), The flipped classroom: A survey of the research. 120th ASEE National Conference Proceedings, 30, pp. 1-8. Atlanta, GA, accessed on 03 Sep 2023

[286] Hu H et al, (2014),iPads for STEM teachers: A case study on perceived usefulness, perceived proficiency, intention to adopt, and integration in K-12 instruction. Journal of Educational Technology Development and Exchange, 7, 49-66, accessed on 10 Sep 2023

[287] Tremblay, Eric (2010), "Educating the Mobile Generation – using personal cell phones as audience response systems in post-secondary science teaching", Journal of Computers in Mathematics and Science Teaching. 29 (2): 217–227, Archived from the original on 31 October 2010, accessed on 04 Sep 2023

[288] Cleaver S, (2014), Technology in the Classroom: Helpful or Harmful? Retrieved from http://www.education.com/magazine/article/effective-technology-teaching-child/, accessed on 11 Sep 2023

[289] Laurillard, D. (2002). Rethinking University Teaching: A Conversational Framework for the Effective Use of Educational Technology (2nd ed.), London: Routledge, accessed on 03 Sep 2023

[290] McFarlane, A. (1997). What Are We and How Did We Get Here? Information Technology and Authentic Learning: Realizing the Potential of Computers in the Primary Classroom. London: Routledge, accessed on 03 Sep 2023

[291] Hofer M et al, (2012), TPACK development in teacher education: A longitudinal study of preservice teachers in a secondary M.A.Ed. program. Journal of Research on Technology in Education, 45, 83–106, accessed on 11 Sep 2023

[292] U. S. Department of Education, Office of Educational Technology, (2010), Transforming American education: Learning powered by technology, National Educational Technology Plan 2010, Retrieved March, 20, 2015, from http://nces.ed.gov/pubs2007/2007020.pdf, accessed on 11 Sep 2023

[293] Turkle S, (2011), Alone Together: Why we expect more from Technology and less from Each Other. New York: Basic Books, accessed on 03 Sep 2023

[294] Althoff T et al, (2015). Donor retention in online crowdfunding communities: A case study of DonorsChoose.org. Proceedings of the 24th International Conference on World Wide Web, 34-44, accessed on 11 Sep 2023

[295] Brantley-Dias L, (2013), Goldilocks and TPACK: Is the Construct "Just Right?" Journal of Research on Technology in Education, 46, 103–128, accessed on 11 Sep 2023

[296] Alhusban A. M., (2016), The Impact of Modern Technological Tools on Students' Writing Skills in English as a Second Language, US-China Education Review, 6 (7), 438-443, accessed on 28 Aug 2023

[297] https://topadvantagesof.com/disadvantages-of-technology-in-education/, accessed on 28 Aug 2023

[298] Kaplan, Andreas (2017). Rishi, Bikramjit; Bandyopadhyay, Subir (eds.), "Academia Goes Social Media, MOOC, SPOC, SMOC, and SSOC: The digital transformation of Higher Education Institutions and Universities", Contemporary Issues in Social Media Marketing. Routledge, doi:10.4324/9781315563312-2, accessed on 28 Aug 2023

➤ If the educational environment uses reward-based games to encourage learning, then the child might be more concerned with what they receive through the software or app instead of what they are learning. Although correct answers can be an indication of knowledge, there might not be as much information retention as hoped.[299]

➤ Teachers must set and enforce healthy boundaries when using technology in the classroom to ensure healthy results are possible.[300]

➤ Learning how to work with one another using technology is an essential skill, but it cannot be the other option that teachers introduce to their classroom. We must encourage social interactions that accurately communicate thoughts, feelings, or emotions so that when a child is offline, they can still make a better life for themselves. [301]

➤ Teachers must show students how to access real information, show them how to verify its validity, and then encourage them to use it appropriately.[302]

Evaluation of Necessity of Technical Education for Human Resource Development

The significance of technical education is growing in contemporary economies due to the continuous advancement of technology and the rising complexity of enterprises. Technical education equips students with the requisite skills and information essential for employment in specialized professions and industries, hence facilitating instant job prospects and increased earning capacity. Additionally, it assumes a crucial function in facilitating economic expansion and advancement, addressing the disparity in skills within the labor market, and empowering persons hailing from underprivileged backgrounds. One of the primary facets of technical education is in its emphasis on equipping students with practical skills and comprehensive information essential for executing specified activities or fulfilling designated roles within a given profession or business. The acquisition of these skills and information is highly sought after and essential for those seeking to establish a prosperous professional trajectory. In light of the fast progress of technology, it is essential for people to possess the capacity to adapt and enhance their skill sets in order to sustain competitiveness within their respective domains. Technical education programs undergo regular updates to include the most recent advancements in technology and industry trends, enabling learners to maintain currency and pertinence in their professional pursuits.[303] It can help to bridge the skills gap in the workforce. As technology continues to evolve, new skills are required to meet the demands of different fields and industries. Technical education provides individuals with the necessary skills and knowledge to meet these demands, which can lead to increased productivity and economic growth. The ability of technical education is to empower individuals from disadvantaged backgrounds. Technical education can provide individuals from low-income families or underprivileged communities with the skills and knowledge needed to secure better-paying jobs and improve their standard of living. It is a powerful tool for personal and professional development and it allows individuals to grow and improve their skills over time. Such education can also play a vital role in driving economic growth and development. Technically skilled individuals can contribute to the growth of industries and companies, leading to the creation of jobs and increased productivity. This can help to revitalize communities and create a more sustainable and self-sufficient local economy. Moreover, it can also provide individuals with the skills and knowledge needed to start their own businesses, which can lead to economic development and job creation. Entrepreneurial opportunities can help to create jobs and promote economic growth, while also providing a sense of ownership and control over one's own life.

The only thing that can't be taken away is education. It is the key to making people's dreams come true. But because of the COVID-19 outbreak, 1.6 billion children have had to miss school and have had their learning interrupted. As learning losses keep going up, it is thought that 72 million primary school children will be in "learning poverty," which means they won't be able to read and understand an easy text by the age of 10. There is a chance that 24 million kids will never go to school again. Because of the pandemic, 10 million more girls will be at risk of getting married as children over the next ten years.[304] A UN policy brief on the impact of COVID-19 on women says, 'Evidence from past epidemics shows that adolescent girls are at particular risk of drop out and not returning to school even after the crisis is over.' Online teaching and learning are the best solution. Alternately we need to design new methods to facilitate distance learning, including radio and TV education broadcasting in areas without internet.[305] Computer technology is a form of machine as well. There is almost no aspect of life that has not been influenced by breakthroughs in computer science. Computer and communication technologies have altered the way people live. Previously, if someone wanted to learn anything, they would go to a school and study directly under an instructor. It is now feasible to

[299] Christensen, K. S. (1999). A Comparison of Student Performance in Human Development Classes Using Three Different Modes of Delivery: Online, Face-to-Face, and Combined. Department of Education: Drake University, accessed on 28 Aug 2023

[300] Collaborative asynchronous online learning, US Patent Office, 10 March 2014, Archived from the original on 8 June 2021, accessed on 28 Aug 2023

[301] Culén A et al, (2012), Tweens with the iPad classroom – Cool but not really helpful. International Conference on e-learning and e-technologies in education (ICEEE), (pp. 1-6). Technical University of Lodz, Poland, accessed on 28 Aug 2023

[302] Crane B., "Using Web 2.0 Tools in the K-12 Classroom". Neal-Schuman Publishers, Inc., 2009, accessed on 28 Aug 2023

[303] https://www.collegenp.com/article/technical-education-scope-types-courses-outcomes-importance/, accessed on 12 Sep 2023

[304] Alon T et al, (2020), "The Impact of COVID-19 on Gender Equality", available at: http://faculty.wcas.northwestern.edu/~mdo738/research/COVID19_Gender_March_2020.pdf, accessed 11 Sep 2023

[305] https://www.roomtoread.org/covid-19-response/?, accessed on 13 Sep 2023

attend classes and even get degrees without ever setting foot inside a school facility. Furthermore, non-degree learning, such as continuing education, test prep, and professional education, is now more accessible than ever thanks to new e-Learning and m-Learning technologies. Again, technical education is information about finer skills in life that provide pupils an advantage over mainstream schooling. Audio editing, video editing, voice modulation, recorded coddling, little programming, and so on are fascinating skill sets that need a finer and more sophisticated knowledge.[306] These skills are usually found in students who are artistically inclined or have a softer side to their academic persona, allowing them to experiment and explore rather than follow the rules and stay within the lines. Students are breaking free of traditional career options like that of a general school/college teacher, manager, accountant, banker, business executive, doctor, lawyer, and instead of trying to make a break for jobs that require far more technical knowledge in different trade like electrician, mechanics, welder, fridge/AC mechanics, mobile/TV mechanics, digital marketing, e-banker, mason-man, digital sound or video editing, etc.[307] About one-third of students in bachelor's degree programs change their college major at least once, with 1 out of every 10 student changing majors multiple times. A key reason for this is a lack of hands-on career exploration opportunities during high school. Without career-focused education, students don't have a clear picture of what a future job might actually be like.[308] When you make decisions with little information, you're more likely to have to change your mind later on. But career and technical education is based on the idea of giving kids those hands-on chances with the clear goal of getting a job in mind. They get to learn about the field that goes with the course, get a feel for it, and do some work themselves. Only 54% of potential families are happy with their school's job study program, while almost 85% of families whose kids are in job and Technical Education (CTE) programs are happy with it.[309] The necessity and advantages of technical education and study has been given below.

➢ Technical education encourages self-learning and independence.

➢ It offers employment opportunities that are skill-based and distinction.

➢ Technical education has various levels of studies and a lot of different degrees or certificates too. There are diploma levels, graduate degree levels, post-graduate degree levels, research levels, and even special industrial training institutes for technical education in the world.

➢ It offers specialized courses in different events in various technical fields. This is to adjust to the different sides of technological development and the following economic progress.

➢ The standard of technical education is maintained around the world with the help of international level councils and universities. They generally deal with forming standards and norms and keeping them consistent.

➢ Technical education is the knowledge and skills which can provide or assured sustainable income of human. These jobs pay well enough for individuals to live in society in comfortable manner.

➢ Many students of technical education have started their own companies or small-scale businesses and have managed to provide job opportunities to other educated hands as well.

➢ Technical education schemes do have brilliant opportunities for education, employment, and even internships for those who are new to the business or just want to try it out.

➢ It is the important tools to create small/medium entrepreneur.

➢ Technical education can also promote lifelong learning, which is essential for keeping up with the latest technologies and industry developments. This will allow individuals to stay current and relevant in their careers, and adapt to new technologies as they emerge.

It can also provide a pathway for social mobility, allowing individuals to move up the socioeconomic ladder and achieve a higher standard of living.

➢ Young student and children know their talents and strengths by that point in time. Many students/children of technical education opt for jobs while others opt to attend international technical

➢ All major industries in the modern world rely heavily on some form of data consumption or smart technology. This data could be about the clients, products, services or organizations. Being good at understanding multiple programs is a set of strong skills that won't go wrong at all. Many jobs require written communication. These often require people to explain things that are hard to understand.[310]

➢ Good careers can be made out of technical education. An individual can also earn a respectable amount of money and status from a career in technical work or skill. A large chunk of this can be attributed to the modern world which is gaga over technology and the extremely rapid advancements that are made to it.[311]

➢ Normally, technical schools/institutes have a curriculum tailored to a particular job assignment, while conventional universities involve more extended coursework before acquiring a certain profession's skills. Technical schools/institutes are known to have

[306] GLOBAL HUMANITARIAN RESPONSE PLAN COVID-19 UNITED NATIONS COORDINATED APPEAL APRIL – DECEMBER 2020, available at: https://www.unocha.org/sites/unocha/files/Global-Humanitarian-Response-Plan-COVID-19.pdf, accessed 11 Sep 2023

[307] https://byf.org/5-proven-benefits-of-career-and-technical-education/, accessed on 12 Sep 2023

[308] https://nces.ed.gov/pubs2018/2018434.pdf, accessed on 08 Sep 2023

[309] https://cte.careertech.org/sites/default/files/AdvanceCTE_CommResearchReport_042721.pdf, accessed on 08 Sep 2023

[310] https://abudhabi.globalindianschool.org/blog-details/classroom-strategies-for-child-development, accessed on 12 Sep 2023

[311] https://abudhabi.globalindianschool.org/blog-details/raise-your-childs-knowledge-graph-with-these-simple-tips, accessed on 12 Sep 2023

short courses with programs that can be finished within the year. Since there is less time to stay in college, vocational graduates can immediately join the workforce. In traditional colleges/universities where their programs can last for two or more years, their cost of attendance is undoubtedly expensive, and may even have huge loans by the time they graduate. [312]

➢ Students who attend technical schools/institutes will gain specialized education to develop a particular skill set required for their future job. The program will involve several practical trainings before they can receive their certification. Unlike their 4-year counterparts, trade schools don't need general education subjects and are more focused on the abilities required for a particular profession. In universities, students sometimes get frustrated and delayed when they take up general education such as history, foreign languages, or English.

➢ Students who choose a trade school are almost always certain of the jobs they wish to pursue. These learners are determined to develop their skills and knowledge in particular areas. One of the main reasons students prefer to enroll in a trade school is its financial benefits. It is a lot cheaper than earning a degree from a university. Students can make huge savings since they have a shorter time in college and pay less for textbooks and miscellaneous expenses.

➢ Technical and vocational institutions concentrate more on job-focused, hands-on education in a specific trade or skill. Students can maximize the high-tech facilities in the classroom, which usually are close enough to their future job site. The curriculum of technical schools develops the abilities utilized in the job site and not the lecture room. With trade school, its objective is plain and simple–teach skills and provide the experience needed to succeed in the student's chosen job after graduation.[313]

➢ As students go through their technical education in an actual environment, they become involved in resources and concepts. Such methods intensively prepare them for possible scenarios and problems they will encounter while working. Also, their hands-on training will teach them to work with their tools in an actual simulated environment. Students will learn practical safety from this administered but realistic learning environment.

It is widely acknowledged that throughout the course of the previous century, formal education saw a significant increase in both significance and breadth, as an increasing number of students made the decision to pursue higher education in disciplines such as medicine, engineering, and mathematics. A significant number of individuals pursued undergraduate and graduate degrees, subsequently obtaining lucrative professional positions in the white-collar sector. Currently, with the global shift towards equality, an increasing number of students are showing a preference for technical education. This kind of education provides practical information and skills that are relevant to significant occupations, while also fostering the development of self-reliant individuals and entrepreneurs. Numerous worldwide educational institutions are now providing opportunities for pupils to cultivate their technical abilities and nurture their innate capabilities, starting at the elementary level. Presently, students attending foreign schools located in major cities such as New York, Moscow, Boston, Sydney, London, Delhi, Beijing, Abu Dhabi, Singapore, Malaysia, Hong Kong, Thailand, and others are required to make consequential choices on their professional paths prior to the culmination of their last year of high school, often referred to as the HSC or A level. This age seems to be rather early; nonetheless, it is often observed that children typically possess an awareness of their abilities and strengths throughout this developmental stage. It is noteworthy that a significant number of students pursuing technical education choose to pursue employment opportunities, while another group chooses to enroll at prestigious worldwide technical institutions such as Caltech and MIT, among others. Degree programs or certificate courses offered by local technical schools are comparatively more affordable than traditional four-year programs offered by institutions. The primary factor contributing to this phenomenon is the comparatively short duration of technical training. In addition, these programs provide students the advantage of instantly entering the job within their chosen field. Therefore, this kind of education provides advantages for a large number of young pupils. High schools that prioritize technical education often provide a greater breadth of career guidance to their pupils compared to those that emphasize traditional academic topics. Typically, this includes a greater number of career counseling sessions, courses focused on skill enhancement, and increased availability of guidance from educators to students. Numerous prestigious technical schools maintain affiliations with higher education institutions and enterprises that consistently seek new talent for their technical departments. It is well acknowledged that the progress of a country is contingent upon the efficient exploitation of both human and physical resources, which in turn relies on the training and development of its workforce. Let us examine a nation such as Bangladesh. Bangladesh, being the country with the 8th biggest population globally, has a challenge in terms of the adequacy and significance of its technical workforce relative to its population size. Technical education primarily focuses on the cultivation and enhancement of practical skills. Skilled workers definitely increase productivity. [314]

Technical education and technological expertise play a crucial role in the nation's human resource development. This form of education not only generates a skilled workforce but also boosts productivity and enhances the overall quality of life for the population. In the 21st century, amid the age of science and technology, it is essential to produce qualified individuals capable of meeting the demands of our rapidly advancing

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[312] https://collegecliffs.com/10-benefits-technical-trade-school/, accessed on 12 Sep 2023

[313] https://byf.org/5-proven-benefits-of-career-and-technical-education/, accessed on 12 Sep 2023

[314] https://abudhabi.globalindianschool.org/blog-details/the-importance-of-technical-knowledge-in-the-modern-world, accessed on 13 Sep 2023

world. The link between a nation's technical or vocational education system and its socio-economic progress is undeniable. In countries like Bangladesh, only about 30% of students pursue technical vocational education, a significantly low figure when compared to many developed and even some developing nations. To address this disparity, there is a pressing need to shift the mindset of both parents and students, encouraging them to prioritize technical education over general education. Currently, there are millions of educated young people in the country who are unemployed. This unemployment poses a considerable burden on the nation and its society, leading to frustration among these youths. In some cases, this frustration escalates into criminal activities and substance abuse. The global demand for skilled workers is on the rise, not only in developed countries but also in regions like the Middle East where a significant number of Bangladeshi workers are employed in unskilled positions. It is imperative for nations to invest in technical education to meet this growing demand for skilled labor and ensure the future prosperity of their citizens.[315]

Technical education enables individuals to obtain the necessary skills and information that are vital for the betterment of both society and business. The fast industrialization of Japan may be attributed to the collection of technical skills, knowledge, and know-how, as well as its strong dedication to education, notably in the training of technical professionals. Technical education plays a crucial role in enhancing analytical and functional capabilities, as well as improving efficiency, skills, knowledge, and profitability. These aspects are of utmost importance for the economic growth of any nation. Now we live in a century of technologies, where we found the application of technologies in every aspects of life. Technology has become an integral part of our everyday lives, to the extent that its absence may lead to a sense of unease and inconvenience. In Bangladesh, a significant number of individuals pursue higher education; yet, they have challenges in securing employment opportunities due to a dearth of marketable skills and technical expertise. Technical education equips individuals with specialized knowledge and skills in a certain subject, enabling them to establish their own enterprises and achieve self-employment. Technical education has a crucial role in mitigating unemployment by equipping individuals with specialized skills, therefore contributing to the overall economic progress of a nation. The advancement and economic development of any nation are contingent upon industrialization. Technical education equips individuals with the necessary abilities to effectively operate and build industrial enterprises. Countries have the potential to significantly reduce their foreign currency expenditures by possessing competence in technical knowledge and the necessary skills. In order to facilitate the development of a nation, it is essential to provide a wide range of educational programs that cater to diverse fields of study. This approach ensures a balanced distribution of skilled professionals throughout various sectors, enabling a significant portion of the population to contribute to the country's economic growth via their respective professions. The primary aims of technical education typically encompass the provision of instruction for the purpose of employment and occupation of the workforce, contributing to the sustainable development of the nation, equipping individuals with skills for income generation, fostering small business ventures and entrepreneurship, imparting essential scientific knowledge to address environmental challenges, cultivating a cadre of individuals capable of comprehending and adapting to emerging technologies, and facilitating economic growth through the cultivation of skilled human resources.[316]

Technical education encourages workforce growth and provides individuals with skills that will help them to produce, develop, and establish industries across the nation. It also encourages rivalry among manufacturers of products and services, which leads to improved technology. Better technologies result in lower manufacturing costs and higher profits for entrepreneurs. As a result, the entrepreneur may use this money to start a new firm or expand an existing facility or business. As a consequence, they create more jobs and produce more products and services, increasing the entrepreneur's profit. Investing such profits will expand both employment and output of products and services. This cycle will continue indefinitely. That is, those who work in society assist to better their economic situation and so contribute to the country's economic progress. Again, technical education contributes to the decrease of poverty and economic inequality in society. With increasing economic disparity, the crime rate, rioting, violence, and robbery rise. Every nation should guarantee social fairness. Individuals with strong talent earn more, whereas those with little or no skill receive less. Technical education teaches individuals skills that serve to reduce economic disparity among people. As a result, in order to eliminate poverty and economic disparity, the government must place a greater emphasis on technical education. Technical education educates people to become specialists in their fields, allowing them to create their own businesses or become self-employed, making society self-sufficient and entrepreneur countries self-sufficient.

By giving people skills, training, and better tools, technical education also helps to make people more productive. When production goes up, resources are used more efficiently, resources aren't wasted, and the country makes more money. People can use the money to make things, and the country can grow and get better. It also saves the country's foreign cash by making the best use of its natural resources and people. Technical schooling also helps cut down on the number of people who need help. It also helps a lot of people work for themselves. It makes more people work in families and across the country. In the end, it raises people's living standards by giving them more money, which leads to the economic growth of a country. Technical education

[315] https://thefinancialexpress.com.bd/views/why-technical-education-is-imperative-1580483097, accessed on 13 Sep 2023

[316] https://thefinancialexpress.com.bd/views/why-technical-education-is-imperative-1580483097, accessed on 13 Sep 2023

is an important part of a country's social growth because it gives people the skills, information, attitudes, and ways of thinking that they need. The lack of technical education leads to unemployment, which makes people angry, which in turn raises the crime rate or drug abuse in society and slows down social progress. In reality, technical schooling gives people skills that make them useful or self-sufficient. The job situation changes all the time these days. People who are working now are being thrown out of the market because the demand for their skills is always changing. To keep up with these changes, everyone had to keep their knowledge and skills up to date by training and learning new skills. As you can see, technical schooling is a great way to keep society healthy. Sustainable development is growth that will last for many generations and be useful for a very long time. People's wants must be met for sustainable growth to happen. This means that people can have a better quality of life without sacrificing their future. Sustainable growth is made up of three main parts. Social sustainable development means it must maintain adequate health, education and other services. It must maintain equality of gender, equal opportunity and distribution, participation and accountability in politics.

➢ An environmentally sustainable system must maintain bio-diversity, avoids over exploitation of conventional resources, maintain and protect environment, maintain stability of natural resources and atmosphere.

➢ An economically sustainable system must produce goods and services continuously, maintain external and government debts to manageable extents, and avoid things that disturb balance in sector which can leads to damage in agricultural and industrial production.

Technical education prepares students for careers in a variety of professions and sectors, many of which are in great demand. Individuals may remain competitive in their areas by staying up to speed with the newest technology and industry advancements via technical education. Individuals with technical skills may help sectors and businesses thrive, resulting in job creation and higher production. Individuals from low-income households or impoverished areas might benefit from technical education by acquiring the skills and knowledge required to acquire better-paying employment and enhance their quality of life. Technical education programs should be tailored to the specific needs of disadvantaged communities, such as offering programs relevant to the community's prevalent industries and providing training and support for individuals who may lack basic education or have limited English proficiency. In addition to offering technical education, it is critical to concentrate on the entire development of disadvantaged communities by providing access to healthcare, housing, and other types of assistance, all of which may contribute to the creation of a stable and supportive environment in which people can flourish. Indeed, technical education may assist to reduce the consequences of automation by equipping people with new skills and knowledge that will be in high demand in the future. As technology advances and many occupations become more automated, it is becoming more

vital for people to have a varied range of talents that are not confined to a single profession or business. Technical education programs that concentrate on delivering transferable skills across sectors might help students be more adaptable to work market changes.

People in the future workforce will need both technical and non-technical skills, and people with a good mix of both will be in high demand. People can learn the technical skills they'll need in the future while also improving their problem-solving, "soft skills," and other important skills through technical schooling. Technologists and engineers come up with new ideas and work on making products that help people. For a country's economy to grow, it needs new technologies, better technologies, new ideas, creative thought, skills, and trained skilled workers. The creation of new items creates job opportunities. When more people are working, they have more money to spend on things like health care and schooling, which is good for the nation's social and economic growth. When people get the right education, they can easily understand, become more polite, and move forward. Getting educated gives you skills and makes life better. If everyone in the country went to school, it would grow. When creating a product, we need to think about how to make the best use of resources by protecting the earth and making sure that resources are always available. Technologists and engineers are very important to sustainable development because they help solve problems like pollution, population growth, running out of natural resources, finding the right tools, and so on. Technologists and engineers today think about how their work affects people, the economy, and the world. People are drastically changing natural resources in order to meet the wants of society. This makes it very hard to balance the needs of people with the needs of the world ecosystem. Technologists and engineers play a big part in making sure that society's needs, health, and well-being are met with little to no waste of resources, all while protecting the earth and making sure that resources last. In the end, technical schooling is necessary for any country to grow its economy and stay developed. Technical schooling can help lower unemployment, save money on foreign exchange, fight poverty, and level the playing field for everyone. It teaches people the skills they need to be good, responsible members of a country. Making the best use of a country's natural resources is important for its growth. Productivity is a measure of how well people are living and how much a country has grown. A country with a high production score makes better use of its natural resources and can do better economically. To turn a country's natural resources into useful goods, it needs skilled workers, and technical schooling is the best way to get those workers. As a result, a country can only grow and succeed in the long term if its expert and skilled workers can be hired by other countries and even by sending money back to the country as income.

Conclusion

We live in a digital and smart era, and digitization and smart technology have permeated practically every area of our lives. It has become a part of our daily lives. Digital and smart technologies are also becoming at-

tractive areas of study. This will also serve as a distraction from the monotony of the classroom, books, and notes. Use software, videos, e-learning books, audio books, podcasts, and other media to educate and expand the knowledge of children and young pupils. The internet has also provided us with tools that allow students to attend online classes and take quizzes, exams, and worksheets. This whole experience has been both enlightening and satisfying. Parents may urge their children to utilize their mobile devices and computers to study instead of spending lengthy hours playing video games. Visual and auditory aids are one of the several methods in which a youngster may study and expand their knowledge. These auditory and visual modalities make learning considerably more engaging and novel. In reality, technology is creating new avenues for today's students to study. There are three types of intelligence that we observe in children today: emotional intelligence, creative intelligence, and instructional intelligence. The conventional classroom atmosphere, which favors lecture-based courses, favors the latter choice. Standardized exams and comparable rating systems do the same thing. When kids have access to technology as we have today, individuals who flourish outside of the traditional learning environment may still reach their full potential. Technology enables youngsters to express their curiosity in a variety of ways. Because they have access to technology, they can attempt new activities without fear of being humiliated. It enables pupils to work via trial and error as they see fit, allowing them to learn more successfully. Technology enables and provides students with convenient access to data and research resources from a single place. It enables a student to get all of the materials they need for a project from a single source. Instead of wasting time looking for something particular or waiting for their library to order it, students may use Google or another search engine to obtain their supporting resources and information.

The education field has always been the last to make big changes, sticking to old ways of teaching and technology. But as schools become more digital and use smart technology, teachers are adding new, more advanced features. Over time, students are becoming less interested in traditional ways of teaching and more interested in eLearning and digital change. Our whole school system will move forward as more and more digital and smart trends take hold. Besides money problems, education has other resource problems as well. As we all know, school days are limited, and teaching time is very valuable. Many students around the world spend more time in school than students in the US, Japan, and Germany. However, students in these countries usually spend less time in school. New developments in testing technology might be good for both teachers and students. That way, teachers won't know if their students have understood the lesson and lawmakers won't know if their changes have worked. Since the optical scan answer sheet was first made fifty years ago, assessment technology hasn't changed much, if at all. New tools for testing can help lower the cost of testing, and some of them let tests be given accurately in real time. Thanks to improvements in tests, students can be graded in a setting with low risks. Students who know about the newest technology advances will be able to learn more about many subjects and gain new skills they can use in the future. Also, these students will have a better chance of getting a job because they will know a lot about the newest trends in many fields. They will also be able to help modern businesses and organizations become more efficient thanks to their smart knowledge and skills.

Technical education plays a crucial role in mitigating the skills gap within the labor market, as it equips people with the requisite expertise and understanding to effectively address the diverse requirements of various sectors, services, and industries. Technical education has the potential to provide students with the necessary skills and knowledge required to initiate entrepreneurial endeavors, therefore fostering economic growth and facilitating the generation of employment opportunities. Acquiring new skills and information that are anticipated to be in high demand in the future might assist people in reducing the consequences of automation. The inclusion of technical education may effectively facilitate the cultivation of lifelong learning, a crucial component in remaining abreast of contemporary technology and advancements within the industrial sector. Ensuring the accessibility and affordability of technical education for persons hailing from underprivileged areas is essential. This may be achieved via the provision of financial assistance, scholarships, and many other types of support. Technical education programs often include practical projects and real-world problem-solving exercises, enabling students to effectively utilize their technical abilities in addressing tangible global challenges. Therefore, it is imperative that these programs be intentionally crafted to foster inclusivity and cultural sensitivity, so guaranteeing a sense of acceptance and assistance for those hailing from marginalized areas. These programs need to provide supplementary assistance to students outside of the traditional classroom setting, including services such as career counseling, job placement assistance, mentoring initiatives, and similar provisions. In the contemporary economy, acquiring skills and knowledge is of utmost importance as it equips people with the necessary tools to thrive in a society characterized by fast change and technological advancement. The aforementioned factor assumes a crucial function in stimulating economic expansion and advancement, facilitating the reduction of skill disparities within the labor market, and enabling persons from marginalized backgrounds to gain agency and autonomy. Ensuring accessibility, affordability, and inclusivity of technical education is crucial in order to provide equal opportunities for all individuals to access and excel in such educational pursuits. The technology in question has significant potential for both personal and professional advancement, playing a crucial role in the overall progress and maturation of society. Advanced technology, such as digital and smart technologies, has both advantages and disadvantages in the field of education. However, it is important to acknowledge that these limits are inevitable and should not be disregarded. In the next years, technical education is expected to have a crucial role in fostering both individual and national economic growth.