

Volume 1, Issue 1

Research Article

Date of Submission: 21 March, 2025

Date of Acceptance: 06 June, 2025

Date of Publication: 11 June, 2025

Teachers' Perspective of Technology Integration Effects on Students Learning at University Level

Zahid Ali^{1*}, Sumaira Younis², Nazir Ahmad^{3*}, Farukh Saba⁴ and Noor Ullah⁵

¹Associate Professor, School of Education, American International Theism University Florida-USA

²Scholar, Department of Education, National University of Modern Languages, Karachi Campus

³Assistant Professor, Department of Teacher Education, Federal Urdu University of Arts, Science & Technology Karachi, Pakistan

⁴M.Phil. Scholar, Department of Education, Benazir Bhutto Shaheed University Lyari, Karachi

⁵Islamic Culture Center Oslo, Norway

***Corresponding Author:**

Zahid Ali, Associate Professor, School of Education, American International Theism University Florida-USA.

Citation: Ali, Z., Younis, S., Ahmad, N., Saba, F., Ullah, N. (2025). Teachers' Perspective of Technology Integration Effects on Students Learning at University Level. *J Rehabil Res Curr Updates*, 1(1), 01-06.

Abstract

In order to create technologically proficient students in this age of digital natives, teachers' must improve their own technological literacy. Educators that incorporate technological tools into their lessons need to be knowledgeable professionals. Unfortunately, teachers at public universities are not prepared to make the most of the expansion possibilities offered by incorporating technology into their lessons. In this study, the expertise of four university teachers were evaluated regarding use of technology in their lessons. Teachers' reflections, classroom observations, instructional artifacts, and semi-structured interviews provided the data. According to the results, educators were least confident in their content knowledge, followed by their technological knowledge, and finally by their pedagogical knowledge relevant to technology integration. Furthermore, they lacked a diversity of teaching techniques to provide a rich learning environment. The information that was gathered and analyzed thematically, as well as the conclusions that were drawn from the perceived understanding of the four educators regarding their confidence in their ability to use technology in the classroom, highlighted the significance of ensuring that all students have access to technology, the value of offering professional development opportunities based on technological expertise, and the requirement to prioritize instructional design for the purpose of technology integration. The resources that teachers require to integrate technology into their lessons in a way that is most beneficial to students are readily available to them. The findings of the study showed that teachers adapted their digital pedagogies in order to meet the requirements of their individual classrooms. To be considered technologically literate and competent, a one must not only have a firm grasp of digital resources but also a full understanding of the context in which such resources are used. For university instruction to be more effective, it is vital that faculty members improve their knowledge, abilities, and use of technology. The results of the study offer both an understanding of the thought processes of educators and evidence of their proficiency in the application of technology in the learning environment.

Keywords: University Teachers, Technology integration, Students' Learning

Introduction

Technology Integration in Education

Today's technology is so integrated into daily life and culture that it defies easy categorization [1]. states that the term "technology" is used to describe any item or process that can be used in a practical setting [2]. define technology as a collection of tools made feasible by human knowledge of how to combine resources to create goods, solve problems, fulfil needs, or satisfy wants. The term "technology" encompasses both new and old methods of production [2]. This prior empirical research all came to the same conclusion: the term "technology" encompasses not just the tools (such

computers and the internet), but also the knowledge, expertise, and techniques used to complete a task. The term "technology integration" is used to describe the use of digital tools (such as computers, programs, the Internet, and peripherals like projectors and printers) in formal and informal learning settings. According to a technology-integrated classroom is one in which students utilize technology to learn and exhibit comprehension of course material, rather than simply to display mastery of a specific tool [3]. As a result, educators have a variety of options for incorporating technology into the classroom, and students can be encouraged to do the same. In order to improve their students' learning, teachers can also make use of technological tools in conjunction with their pedagogical and subject-area expertise.

In today's world, where so many people were born and raised with computers at their fingertips, it's crucial that educators maintain and improve their skills in order to provide students with the best possible education. In addition, global advancements necessitate a swift shift in pedagogical philosophies and methods, necessitating a reworking or reconstruction of the current teacher education programs and structure. When educators are able to keep up with the latest developments in their fields, they are better able to expand their own pedagogical expertise, subject knowledge, and use of technological tools. Over the past three decades, one of the most important factors in raising the overall quality of teachers' instruction has been their participation in ongoing professional development. Teachers also need the option to keep abreast of the usage of digital technologies in the classroom as the importance of using digital resources in instruction grows. One key contributor to effective classroom outcomes is the widespread adoption of technological tools. When it comes to teacher development programs, many people have been concentrating on bettering classroom practices and expanding teachers' knowledge of subject matter [4]. The need for teacher preparation that can adapt to shifting pedagogical technologies is emphasized by [5].

The role of the teacher has shifted from knowledge keeper to that of coach, mentor, enabler, facilitator, or advisor in today's information-rich, technology-driven society [6]. The teacher's job is to set the stage for learning and lead the class in the proper direction. Teachers should not rely solely on outdated practices to fulfill this function, but rather should be cognizant of the ways in which technological advances might improve the quality of instruction and student outcomes. According to one study teachers' usage of technology in the classroom may have been influenced by their preparation during their first teacher education [7]. Because most programs only require pre-service teachers to take one technology skills-based oriented course, they aren't preparing them to use technology in a pedagogically sound way [8]. It is well acknowledged, however, that proficiency in technology is not sufficient for making successful use of technology in the classroom [9]. To put it another way, "preparing pre-service teachers for ICT integration is a complex job given the fast-changing nature of ICT and the multiple sources of knowledge which need to be synthesized" [8]. They all agreed that teachers need to know how to combine technology with pedagogy and content for it to be successful in the classroom [10]. This is due to the fact that using technology in the classroom requires not only technical know-how, but also pedagogical expertise and subject matter expertise.

Effective use of technology in the classroom requires that these concepts be combined and addressed as a whole [11]. highlighted that the International Society for Technology in Education has challenged educators to imagine what kids would need to know about technology in order to succeed in today's world. Teachers are being pressured, and in some cases forced, to use technology in the classroom, not just because it's cool, but because it will improve their practice and the learning of their students. This is because tools like these can strengthen students' abilities to continue learning and connecting throughout their lives. The roles and responsibilities of educators are shifting as a direct result of the impact and influence of technology on students' education. Teachers now have the tools to adapt their lessons to the learning styles of students who grew up in the digital age. Teachers' previous strategies and attitudes weren't working with today's tech-savvy students, thus they needed to evolve [12].

Research Focus

This research focuses on teachers' knowledge and skills of technology and its integration of their teaching practices in order to improve their own professional capabilities and students' performance. This research also focuses on the effectiveness of technological knowledge on students' performance through teachers' perceptions particularly reference to a public sector university in Karachi Pakistan.

Literature Review

The importance of using technology in the classroom has grown as a result of the need for educators to maintain the same level of technical fluency as their students. To keep up with the demands of today's "digital natives," who are fluent in using technology but also reliant on it for their daily lives (Prensky, 2001, Richards, 2014), it's necessary to adapt to their preferred learning styles. Features of the 19th and 20th centuries are distinct from those of the 21st century [13]. argues that the arrival in the 21st century has brought about a proliferation of new forms of technology, communication, and information that have altered not just our day-to-day lives but also our ability to pass on knowledge to future generations. Technology has become increasingly important in the classroom as a result of the exponential growth of information and the pervasiveness of electronic gadgets in modern life [14,15].

Today's civilizations are highly dependent on technology, and the rapid pace of technological advancement has altered both societal norms and individual attitudes and behaviors [16]. According to the widespread adoption of

digital technology has drastically altered the daily routines of most areas of human employment, leading advocates of technology in education to anticipate comparable effects on the classroom setting [2]. Technology's contributions to education include "the capacity to deliver interactive content, provide immediate feedback, diagnose student needs, deliver effective remediation, evaluate learning, and store examples of student work" [17].

Traditional course materials can now be sent to students in far-flung locations through the internet with relative ease. As a result, technology has made it easier for teachers to reach out to and interact with pupils who live far away. Therefore, technology has eased the burden of remote learning, whether it be synchronous or asynchronous. Blogs and wikis are facilitating this kind of asynchronous learning and delivery of educational and learning information and materials. According to Lai (2008), students have benefited greatly from teachers' and students' open communication on various topics via email and video conferencing. Technology has been shown to enhance student-teacher communication when working together on projects [18]. Students can experience virtual reality thanks to advancements in digital technology. Students have the opportunity to refine the skills that will be necessary for them to be successful in the job without ever having to put themselves in harm's way in the "real world." Students in one country now have the ability to collaborate with students in another country while working together inside of a digital laboratory environment [19]. provided a more succinct summary of the benefits of information and communication technology (ICT) in education by noting that these tools help to speed up and improve the production of school work, boost motivation and engagement, facilitate exploration and experimentation, and promote self-regulated and collaborative learning [19]. also mentioned that these advantages help to make the case for the use of ICT in education.

Using technology in the classroom comes with a number of advantages; however, there are also a few disadvantages to consider. According to there are challenges associated with adaptability, connectivity, and compatibility, in addition to those associated with locating qualified personnel, the appropriate technology, sufficient resources, and adequate funding [8,15,20]. Despite these challenges, governments and other stakeholders in education are investing in technology in the belief that the affordances they bring would facilitate and improve teaching and learning. People are naturally fascinated about the precise methods in which modern educators are utilizing current technological tools into their teaching because of the high stakes that are involved. The availability of innovative technologies and the substantial investments that governments are making in education technology have both contributed to the rise in public interest in the efficacy of technology in the classroom. According to, the general public has a legal obligation to be informed regarding the manner in which the expenditure of their hard-earned money on educational technology is managed and whether or not the technology is producing the results that were hoped for in the classroom. Because of the rapid advancement of technology and the various ways in which it is being utilized in schools, academic institutions are coming under increasing amounts of pressure to find ways to more effectively integrate technology into classrooms[21,22].

Methodology and Procedure

The qualitative research approach[23]. was used in this study, and the experiences of four university faculty members, (two male and two female) in applying technology practices were studied and reported on. Making use of a semi-structured questionnaire Data was collected and analyzed using interviews, observations, teaching materials, and the teacher feedback. Before being considered for employment, teachers must have professional qualifications and have undergone trainings and professional development programs on technology and its use in educational settings. The research objectives and technical knowledge components were used to inform the development of tools (questionnaires, interviews, and observations) targeted at gathering data related to teachers' knowledge and teaching practices, as well as their use of technologies in their classes. The questionnaire was evaluated by experts in the field, and it was piloted with other teachers, who were determined to be valid; nevertheless, those data were deleted from the final analysis. The interview questions centered on the new standards and how teachers incorporate technology into their teaching practices in light of 21st century skills and the present digital world.

This was done so that we could validate the technological implementation and teaching approaches that we witnessed and observed in action in the classroom during the interviews. The checklists were created as a framework for the observations, and they included information about how teachers led the lessons. When faculty members at universities were requested to take part in interviews and observations. Just four of the six faculty members were able to take part in the research. Each interview lasted 50 to 60 minutes and was scheduled at the convenience of the faculty members. The interviews were place in a quiet section of the campus, away from other students and faculty. To avoid misunderstandings, the conversation was held in a combination of Urdu and English languages. Teachers were observed and their practices were recorded using observation checklists from the beginning to the end of meetings.

Thematic Analysis and Findings Key Findings

The findings indicated that teachers had the least degree of confidence in their subject knowledge, followed by their technological expertise, and then their pedagogical understanding with regard to how technology may be integrated into the classroom. They also lacked strong plans for creating and implementing technology integrated instruction, a variety of teaching methodologies to present students with, and an inadequate grasp of how technology links with content areas and how to make alignments across content standards. In addition, they had an inadequate understanding of how technology interacts with content areas and how to make alignments across content standards. In addition, the thematic analysis of this study indicated that there should be adjustments made in the educational setting for both students

and teachers, as well as in the physical configuration of classrooms. For example, providing access to helpful forms of technological apparatus. Increasing one's own digital literacy through education in emerging types of technology. Altering the set-up of the classroom in order to facilitate simpler learning. Providing a variety of training and educational programs with a focus on technological skills. Putting an emphasis on the significance of instructional design as it relates to the implementation of technology in the classroom.

Discussions

Although integrating technology into the classroom is crucial to education's development, doing so in places like public institutions can be challenging due to instructors' lack of preparation. This research set out to examine the aforementioned issue by gauging the knowledge of four teachers from different educational institutions. In order to compile the data, we employed interviews that were only semi-structured. The findings indicated that teachers had the least amount of trust in their topic knowledge, which was followed by their technological competence, and then their pedagogical knowledge about the implementation of technology in the classroom. The results of three interviews with educators revealed five recurring themes in relation to the use of technology in the classroom.

These themes are as follows: (1) the necessity of placing a premium on instructional design for technology integration; (2) the provision of technical resources; (3) the necessity of fostering students' critical thinking skills through the use of technology; (4) the necessity of technology-based professional development opportunities for acquiring and enhancing technology literacy; and (5) reimagining the learning space to better accommodate technology. Because of these findings, the technological pedagogical and content knowledge (TPACK) framework's derivation and classification of technology integration competences for university instructors may be utilized. The competencies can serve as a roadmap for teachers seeking additional information on how to successfully integrate technology into their lesson plans and classrooms. This study contributes to a better understanding of teaching strategies utilized at the university level by shedding light on the opinions held by faculty members regarding the incorporation of technology and identifying key skills for practice. The data and analysis also demonstrated that the professional competency of instructors, as assessed by their knowledge of the area and their use of technology, does not have a significant effect on the achievement of pupils. Second, teachers typically lack confidence in their own abilities when it comes to integrating various forms of technology and technical tools into the classroom. This is made even worse by the scarcity of possibilities for professional growth that concentrate on the incorporation of new technologies and the advancement of professional knowledge.

The participants in this study talked and indicated that they could accomplish, comprehend, or know the most of the activities mentioned in the items of the interview questionnaire; nevertheless, they were unable to totally execute the technological due to a lack of a suitable environment in the institutions where they worked. The outcomes of this study shed light on the fluid nature of the connection that educators have with various forms of technology. According to the findings, educators modify their degree of technical savvy to account for the particulars of the learning environment, and they have been seeking to develop their skills despite the scarcity of accessible means to do so. This is the case despite the fact that there are fewer available means. As a result, it is essential to lay a greater emphasis on the significance of contextual variables on the development of technology, its usage, and its application at the level of public sector universities, and it is also essential to embed technologies in the context. On the other hand, there is a paucity of research that focuses on the Pakistani context, and in the past, researchers have not placed a significant amount of importance on the relevance of contextual elements.

This study's results are in line with those of other studies conducted in a variety of settings around the world [24-30]. As the literature of this study illustrates, several investigations have been undertaken on the relationship between teachers' technological expertise and the learning of their students in a range of settings across the globe and at various educational levels. These studies have been conducted at different educational levels. By exploring the effect of teacher technical expertise on student performance within the context of public sector universities in Karachi, Pakistan, the current study makes a substantial contribution to the existing body of research by addressing a gap in the existing body of information.

Conclusion

According to the findings of this research, one may draw the conclusion that university instructors lack the confidence to make effective use of various technologies in their classes. They are lacking in comprehension of fundamental computer and technology literacy. As a result, the impacts of instructors' professional knowledge and the integration of technology on the performance of their students are minor. According to the findings of the investigation, educators have been teaching content in a piecemeal fashion; nevertheless, there is a pressing requirement for the creation of a holistic, blended, and integrated nature as an alternative to simply teaching each of the disciplines in isolation [31-35]. The incorporation of up-to-date technical knowledge, skills, and a heightened awareness of these tools' potential in the classroom is a responsibility that falls squarely on the shoulders of educators.

Implications of the Research on Teachers' Educational Practice

This study shows that educators lack the technical expertise to effectively integrate technology into their classrooms. Their professional teaching and technological skills fell short, resulting in unproductive lessons for their students. This was especially true when it came to incorporating and making use of technological tools. Therefore, one must have

concurrently and integrated developed their technical and computational thinking and usage of technological gadgets in order to build technological knowledge. The results of this study suggest that classroom instruction is improved when technology is used in tandem with human interaction. We need to move away from teaching technology as a separate subject and toward an infusion or embedded paradigm where technology is used in all subjects. Instead of learning content without the use of technology, teachers should be trained in a variety of teaching methods and strategies, including the pedagogies and tools they might use to teach those methods and skills.

Therefore, it's important to teach and model content, technology, and pedagogical abilities all at once. According to a blended, integrated, and connected approach to technology, pedagogy, and material that takes into account the classroom circumstances will help students learn more effectively [2]. Based on the results of this research, efforts to expand teachers' technology literacy should prioritize training them to think holistically. To meet the needs of today's tech-savvy students, educators must invest in their own professional development and keep up with the latest developments in the field of digital education. As a result, professional development programs for educators should shift their focus from preparing educators to teach with technology to preparing students to effectively integrate technology into their own classrooms and pedagogies.

Suggestions for Future Research

This study uncovered new avenues to explore in the field of technology integration. There is a widespread belief that teachers in Pakistan's public universities lack the necessary skills to effectively integrate technology into their classrooms, and that this lack of knowledge has a negligible impact on students' ability to learn. As a result, there is a pressing need to conduct in-depth research into the phenomenon of inadequate use of technology in education settings that cannot meet the challenges of the 21st century and this digital era. This calls for extensive investigation.

The quality of education in public institutions is still inadequate since students' academic performance is not good despite the fact that professors are properly qualified and professionally prepared and have also been blending technology in their teaching. Researchers should look at the causes of the widespread poor quality of education in this country. After all, a teacher's primary objective should be to maximize student learning. There is a need for more investigation into the ways in which the learning environment in the classroom and the scarcity of digital resources at the university level influence instructors' adoption of technology. So that researchers may investigate the topic of insufficient use of technology in education, it is necessary that future studies on stipulate the context focus on mixed methods designs.

References

1. McCrory, R. A. V. E. N. (2008). Science, technology, and teaching: The topic-specific challenges of TPCK in science. *Handbook of technological pedagogical content knowledge (TPCK) for educators*, 193-206.
2. Koehler, M., & Mishra, P. (2009). What is technological pedagogical content knowledge (TPACK). *Contemporary issues in technology and teacher education*, 9(1), 60-70.
3. Hertz, M. B. (2011). What does "technology integration" mean. CA: The George Lucas Educational Foundation. Retrieved from www.edutopia.org/blog/meaning-techintegration-elementary-mary-beth-hertz.
4. Harris, J. B., Phillips, M., Koehler, M. J., & Rosenberg, J. M. (2017). Editorial 33 (3): TPCK/TPACK research and development: Past, present, and future directions. *Australasian Journal of Educational Technology*, 33(3).
5. Abanobi, C. C., & Abanobi, C. H. (2017). Teacher Education in Nigeria; Challenges and way forward in the global community. *International Journal for Social Studies*, 3(8), 39-46.
6. Knight, S. L., Pedersen, S., & Peters, W. (2004). Connecting the university with a professional development school: Pre-service teachers' attitudes toward the use of compressed video. *Journal of Technology and Teacher Education*, 12(1), 139-154.
7. Swain, C. (2006). Preservice teacher's self-assessment using technology: Determining what is worthwhile and looking for changes in daily teaching and learning practices. *Journal of Technology and Teacher Education*, 14(1), 29-59.
8. Chai, C. S., Koh, J. H. L., & Tsai, C. C. (2010). Facilitating preservice teachers' development of technological, pedagogical, and content knowledge (TPACK). *Journal of Educational Technology & Society*, 13(4), 63-73.
9. Hardy, M. (2010). Enhancing preservice mathematics teachers' TPCK. *Journal of Computers in Mathematics and Science teaching*, 29(1), 73-86.
10. Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers college record*, 108(6), 1017-1054.
11. Niess, M. L., Ronau, R. N., Shafer, K. G., Driskell, S. O., Harper, S. R., Johnston, C., ... & Kersaint, G. (2009). Mathematics teacher TPACK standards and development model. *Contemporary issues in technology and teacher education*, 9(1), 4-24.
12. Ali, Z., Thomas, M., & Hamid, S. (2020). teacher educatorS'PercePtion of techHnoLoGical PedagoGical and content knowLedGe on tHeir claSSroom teachinG. *New Horizons*, 14(2), 17-38.
13. Niess, M. L. (2005). Preparing teachers to teach science and mathematics with technology: Developing a technology pedagogical content knowledge. *Teaching and teacher education*, 21(5), 509-523.
14. Ali, Z., Azam, R., & Saba, F. (2023). Technological Pedagogical and Content Knowledge of Pre-Service Elementary School Teachers in Karachi, Pakistan: A Quantitative Study. *Journal of Social Sciences Review*, 3(1), 678-688.

15. Yalçın, M., & Çelikler, D. (2011). The effect of computer-assisted applications in the teaching of "matter and heat" subject. *Eğitim araştırmaları-Eurasian Journal of Educational Research*, 42, 273-290.
16. Hixon, E., & Buckenmeyer, J. (2009). Revisiting technology integration in schools: Implications for professional development. *Computers in the Schools*, 26(2), 130-146.
17. Watson, S. L., & Watson, W. R. (2011). The role of technology and computer-based instruction in a disadvantaged alternative school's culture of learning. *Computers in the Schools*, 28(1), 39-55.
18. Kaldoudi, E., Dovrolis, N., Konstantinidis, S. T., & Bamidis, P. D. (2010). Depicting educational content repurposing context and inheritance. *IEEE Transactions on Information Technology in Biomedicine*, 15(1), 164-170.
19. Osborne, J., & Hennessy, S. (2003). Literature review in science education and the role of ICT: Promise, problems and future directions.
20. Al-Bataineh, A., & Brooks, L. (2003). Challenges, advantages, and disadvantages of instructional technology in the community college classroom. *Community College Journal of Research & Practice*, 27(6), 473-484.
21. Alayyar, G. M., Fisser, P., & Voogt, J. (2012). Developing technological pedagogical content knowledge in pre-service science teachers: Support from blended learning. *Australasian journal of educational technology*, 28(8).
22. Ali, Z., Rehman, H. U., & Ullah, N. (2022). Measuring University Teacher Educators' Knowledge and Skills Using TPACK in Teachers Education Programs. *Research Journal of Social Sciences and Economics Review*, 3(3), 83-91.
23. Creswell, J. W. (2014). *Research design qualitative, quantitative, and mixed methods approach*. (4th Ed.). Thousand Oaks, CA: Sage.
24. Carpenter, J. P., Rosenberg, J. M., Dousay, T. A., Romero-Hall, E., Trust, T., Kessler, A., ... & Krutka, D. G. (2020). What should teacher educators know about technology? Perspectives and self-assessments. *Teaching and teacher education*, 95, 103124.
25. Harris, J. B., & Hofer, M. J. (2017). "TPACK stories": Schools and school districts repurposing a theoretical construct for technology-related professional development. *Journal of Research on Technology in Education*, 49(1-2), 1-15.
26. Kirikçılar, R. G., & Yildiz, A. (2018). Technological Pedagogical Content Knowledge (TPACK) Craft: Utilization of the TPACK When Designing the GeoGebra Activities. *Acta Didactica Napocensia*, 11(1), 101-116.
27. Ali, Z., Thomas, M., Ahmed, N., Ahmed, I., & Ahmed, I. (2020). Assessment of Pre-Service Teacher's Perceptions on Technological Pedagogical and Content Knowledge (TPACK) in Karachi Pakistan. *International Journal of Scientific & Engineering Research*, 11(3), 1402-1407.
28. Ali, Z., Busch, M., Qaisrani, M. N., & Rehman, H. U. (2020). The influence of teachers' professional competencies on students' achievement: a quantitative research study. *American Research Journal of Humanities & Social Science*, 3(6), 45-54.
29. Ali, Z., Ahmad, N., & Sewani, R. (2022). Examining Elementary School Teachers' Professional Proficiencies with Technology Integration and Their Impact on Students' Achievement. *Journal of Positive School Psychology*, 6(7), 2950-2968.
30. Ali, Z., Rehmat Shah, D., & Ahmad, N. (2023). Determining the Science, Technology, Engineering, and Mathematics Teaching Capabilities of Educators in Karachi, Pakistan. *Journal of Positive School Psychology*, 11-28.
31. Graham, C. R. (2011). Theoretical considerations for understanding technological pedagogical content knowledge (TPACK). *Computers & Education*, 57: 1953-1960.
32. Lai, M. L. (2008). Technology readiness, internet self-efficacy and computing experience of professional accounting students. *Campus-Wide Information Systems*.
33. Mishra, P., & Koehler, M. J. (2008, March). Introducing technological pedagogical content knowledge. In annual meeting of the American Educational Research Association (Vol. 1, p. 16).
34. Mishra, P., Koehler, M. J., & Kereluik, K. (2009). The song remains the same: Looking back to the future of educational technology. *Tec trends*, 53(5):48-53.
35. Okwumabua, T. M., Walker, K. M., Hu, X., & Watson, A. (2011). An exploration of African American students' attitudes toward online learning. *Urban Education*, 46(2), 241-250.