



Exploring the Effectiveness of Technology in Maximizing Private Primary Grade Students' Engagement: Evidence from Karachi

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ABSTRACT

This study evaluates the effectiveness of technology in maximizing students' engagement in primary grades in Karachi. The research was conducted using structured questionnaire survey and interviews involving teachers and parents. Moreover, the classroom observation including two groups of students; a control group taught using traditional method and treatment group taught with technology-integrated approaches. Data were collected from n= 120 participants. The research established the rapport with the school stakeholders to ensure smooth and seamless data collection. Observations focused on students' engagement levels, participation rates and behavioral indicators of interest during lessons. Findings revealed that the integration of technology and digital tools significantly enhance students' engagement level, fostering interactive and positive learning environment and increasing motivation amount students. However, challenges such as insufficient teacher training and resource limitation were also identified in private schools of Karachi. The research study recommends targeted capacity building initiatives for teachers, provision of necessary technology, digital tools and tech support. Collaboration between stakeholders can address those challenges effectively by keeping an annual budget. The literature emphasizes that the use of technology and digital tools can positively affect the students' engagement level in learning spaces, motivation and learning outcomes, particularly when implemented with adequate training and support by the management, teachers and tech experts. The study contributes the growing body of evidence advocating for technology-enhanced learning as a means to improve educational experiences in primary grade classrooms.



Introduction

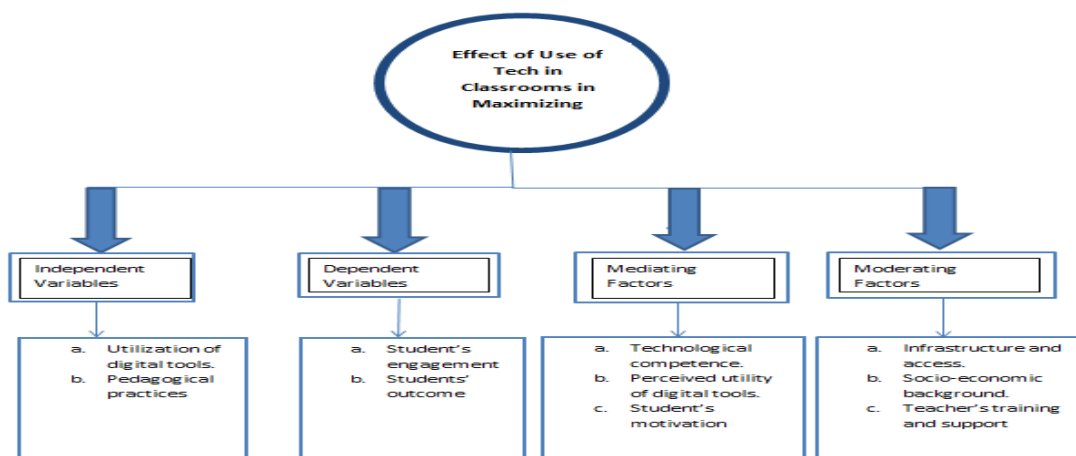
Background of the Study

Technology seems to be widely used everywhere including daily routines. Teachers and students use technology and have grown to see the use of digital tools. The researchers have endeavoured that it is not easy for a practitioner to keep checking whether all students are engaged in a classroom or not, and who is having difficulty understanding the concepts. However, there is one way that can eliminate this problem: the utilization of digital tools for giving lessons and instructions in the educational space. This implementation can augment technologically-rich learning. The intent of this study was to inquire into the implication of digital tools and their perception on teachers and students. Interviews with teachers and learners revealed that there is a major impact on students' engagement and motivation. This research aims to explore how technology can maximize the engagement of students and address challenges faced by the learners. By examining the experiences of teachers and students, this study seeks to provide insights into how digital tools can enhance the quality education and contribute to more engaged and motivated learners. The word technology includes the projector, multimedia, Tablets etc. but this study is also covering the digital tools that is closely related to the technology and includes different software and E-Learning applications.

Problem Statement

At present, teachers are using technology in classrooms in Karachi for primary-grade students. But the question is whether these digital tools and technology help in maximizing the engagement of students in class? That is what this study found out. By looking closely into this topic and analyzing, researchers found some results that reveal whether deployment of technology is helping in increasing collaboration and making learning fun for students. Moreover, this research has tried to find out if there is any positive impact of technology in gaining the students' outcomes including comprehension, engagement and retention. In addition, this study has also examined the potential barriers that could limit the effectiveness of digital tools in the classroom such as limited access to the resources and students' proficiency while handling technology.

Conceptual Framework



This conceptual framework was designed to ensure all the factors effectively evaluate the induction of technology in maximizing students' engagement. This does not involve motivation

and students' outcome directly, but it plays a major role in creating motivation and curiosity as well as producing better results as an outcome. The dependent variables are students' engagement and students' learning outcome whereas the independent variables are utilization of digital tools and technology and pedagogies used by the practitioners to integrate technological-based lesson technological competence, perceived utility of digital tools and student's motivation. While the moderating factors were infrastructure and access, socio-economic background and teacher's training and support.

Purpose of the Study

The objective of this research was to determine the impact of integrating technology in classrooms among young learners aged eight to eleven years in Karachi, Pakistan. The researchers had observed that technology had changed rapidly and new gadgets had already occupied pedagogic experiences at schools and colleges across Pakistan. Technology changed the life of all stakeholders including parents, students and teachers in primary schools across Pakistan. Academicians use technology in their classrooms instructions too. The increasing digital use of these modern gadgets increased use of digital tools. It also accelerated the pedagogies of the early year practitioners. However, where there is a use of technology, many schools have insufficient resources or do not have the trained teachers to meet the needs of today's era. This research has also found the gaps by examining the classrooms, teachers, and students' perceptions, resources, and training required to integrate the technology. Furthermore, this study provides insights on how teachers help students in motivating and making the classroom into an active learning space and how collaboration affects and enhances the skills of the young learners.

Moreover, this research also sheds light on the long-term benefits of integration of technology for primary education. By using this approach, students can not only improve academically, but also develop the skill of problem solving, computer literacy and creativity, all of which are essential to ensure success.

Research Questions

1. How effective is the integration of technology in primary-grade educational environments?
2. How do parents and teachers view the implementation of technology in primary classes?
3. How important is the training required to apply innovations in classrooms for the educators?
4. What are the challenges faced by the private schools in Karachi?

Justification of the Study

The technology utilization and digital tools in learning spaces is playing a significant role in classrooms in educational settings. The practices in private schools of Karachi are changing to get innovative while teaching. In urban areas, there is a rapid change in the advancement of technology. In this way, it is very important to enrich the learning experiences of students with those technological approaches. Moreover, the population in urban areas of Karachi is very diverse considering the culture, linguistics, and infrastructure. To keep these factors in mind, it is very important to promote inclusivity in educational spaces. This study has tried to investigate how effectively digital tools can be used to practice best pedagogies in a classroom environment. In addition, it will help administrators, educators, and policymakers to fill the gaps and work on challenges to foster student engagement and learning.

Basic Assumptions in the Study

Student engagement in lecture halls for active instruction is very crucial which helps in generating students' outcomes. If the technology is being used properly in the classroom, it will enhance the learners' engagement. Additionally, professional training is also important to implement technology in primary classrooms.

Scope of the Study

This study targeted the private schools primary grade students in Karachi typically aged between 8-11 years from Grade III to V grades. The scope includes the type of digital tools utilized in the schools such as educational software, interactive whiteboards, multimedia resources, and online learning platforms/ games. This study has also tried to focus on the population factor and their uniqueness according to the infrastructure and their required needs. Besides, this research will analyze primary school students' experiences and the skills that are being improved by incorporating technology. Additionally, this study has included both quantitative and qualitative research methods through surveys, interviews, observation, and data analysis.

Limitations of the Study

The study has covered a limited number of private schools due to the variety of educational systems. The sample size is not too large. Sampling bias can be a possibility due to the unavailability of the schools and convenience while selecting school

Review of Literature

The study by (Diemer et al., 2012) reveals how educational institutes launched iPads and enhanced the learning of students and for this; a survey was conducted to see students' engagement via a five-option Likert Scale. A greater level of engagement in using the iPad was discovered. The majority of the students said that they are comfortable using the technological tools for learning and those who were uncomfortable, also showed an interest in using it in the future for e-learning.

The leveraging of information and technology is increasing rapidly. Teachers nowadays are approaching those pedagogical methods that increase the level of students' performance. But here teachers' skills, attitudes, and technological knowledge matter a lot. Akram et al (2022) study found out about the perception of technological integration in the past 5 years of Pakistan. The observations reveal that trainers have shown an optimistic outlook towards the utilization of digital tools. In addition, the teachers believe that it enhances their and students' performance and also makes it more interesting while conducting a lesson. This makes the lesson interactive and students feel engaged and motivated throughout. However, there are some barriers too which are low speed of internet, load shedding of electricity, and infrastructure issues that hinder the teaching experiences. According to this study, the concerned authority should implement the use of ICT with effective and positive policies by allocating the budget. Additionally, there should be a supply of equipment in all educational institutes to give equal opportunities to learners.

Over the years, many educators tried to define what the actual use of technology is, believing that there are a variety of tools that are used in classrooms. Items like pencil, printing press, blackboard, and numerous other tools were deemed tech innovations in their time (White et.al, 2002). Today the variety of tech tools are rapidly proliferating and social groups, which primarily includes internet, tablets, computers, multimedia projectors, smart boards scanners and different

application tools (Fu, 2013; Cassidy, 1998; Kingston, 1992). In recent decades, there has been a major shift in the area of digitalization in the learning sector. However, the way that has been used and its implementation is something complex to understand (Cassidy, 1998). It is challenging to overcome the barriers that are hindering the effective use of digital tools. While different methodologies have been proposed to address the challenges, the future remains uncertain.

A review of literature indicates that there has been a major increase in harnessing of digital tech appliances in the learning sector since the 1980s (Selwyn, 2014; Kingston, 1992; Culp et al., 2005; Ertmer, et al., 2012). Early discussion about the integration of technology in education can be traced by the Councils in the US, which recommended the use of technology and Computer Sciences as core studies for High Schools (Culp et al., 2005). A similar trend emerged in the UK as well. Another initiative similar to that started in other English-speaking countries, such as Australia and New Zealand (Schiller, 2003;)

Several case studies in educational technology (EdTech) literature highlight the increasing importance of technology over the past few years particularly in developed countries. This evolution kept technology on the forefront. Policy makers are also showing an interest and efforts towards the inclusion of hardware and software. According to Hixon and Buckenmeyer (2009), there is a common belief amid policy shapers and school owners that provision of technology to the learners and policymakers would eventually lead to the effective use of it. However, only integration of technology will not promise the students' outcome, but also there should be the right teaching practice which is essential for that. The environment of the classroom serves as an essential role in uplifting learners' understanding and achieving the goals set for the year. The idea of this study by (Ahmed et al., 2020) was to explore the impact of classroom environment on learners' performances. The study was descriptive and later it was collected through a survey and organized with mean score and standard deviation where it was proved that ICT integration helps in generating student outcomes.

Tech has changed the pattern of people working on a continuous basis. However, this change has not been adopted by all the educational communities leaving the education behind. This research by Hicks (2011) focused on the merits of the use of software tools in learning sectors and the hurdles of implementing it. Furthermore, there were a few tips given that will be helpful in the future. A quantitative study executed by Varier et al. (2017) reveals an emphasis on technological use for delivering instructions. This implementation can increase technologically rich learning. The motive of this research was to inquire the implication of digital tools and their perception on teachers and students. Interviews with teachers and learners revealed that there is a major impact on students' engagement and motivation.

The deployment of tech in classroom knowledge acquisition by practitioners has rapidly increased in the last decade by integrating laptops for giving instructions related to any topic. Gulek and Demirtas (2005) have researched and found that using technology for classroom learning as an instruction tool can enhance learning and educational outcomes. Additionally, they found that students who have laptops and can use technology are more involved in collaborative work. These students participate more in project-based work and do high-quality research-based work. Moreover, the learners who use digital tools have the skills of problem-solving and critical thinking. In addition, the article provides deeper insights into the overall grade points of laptop and non-laptop students where results reveal greater achievements of laptop students.

This study talks about integrating blended learning models in classrooms to engage learners. It discusses how some of the students are still hesitant to embrace technology. Few investigations reveal how teachers are exploiting the use of tools. During the analysis, Sorbie (n.d.) found out that the teachers assume that mixed-mode learning fosters teamwork, management, involvement, and real-life connections. Based on these findings, professional learning communities were created to enhance the methodology and learning theory.

Most researchers suggest that constructivist approach is the best to integrate technology and is the most beneficial (Levin & Wadmany, 2006;; Cassidy, 1998). McMahon's (2009) study found a constructive connection between rational thinking skills and advanced computing skills. It is stated that the constructivist approach of learning with technology greatly influences the educational system and fosters inquiry-based learning and makes it easy using the tools of technology. One key advantage of behaviorist theory is its ability to motivate learners. One of the studies uncovered that many pedagogues saw tech as a tool for rewarding learners and keeping them engaged during lessons. The impact of the use of technology is now being appreciated and recognized even in small-scale schools. The study by Parks and Tortorelli (2020) examined the impact on the Mathematics and Literacy program introduced in the academic year where just the tablets and tablets with loaded resources were provided. Qualitative data analysis indicated that the use of tablets improved the instructions. Moreover, significant changes were seen in students' foundation skills.

Overtime, numerous arguments have been made to state the need for education reforms and emphasize the role of tech in learning. These involve the demand for new skills in a changing society, the enhancement of outcomes, and pursuit for learning (Hepp et al., 2004). In 1992, American educationist Allan Collins predicted the computers would become an integral part of the schools (Collins, 1991). Another study (Culp et al., 2005) also stated that the role of equipping students with new skills and technology is necessary for the future market. It is seen as a means to improve productivity and help nations develop and strengthen the country. In addition, it also plays an essential role in pedagogy, for example technology can be used in/as an administrative tool (Hepp et al., 2004; Kingston, 1992). It greatly enhances the convenience and efficiency (Reid, 2002) which includes lesson planning, managing students' records, such as grades, attendance and overall progress. Information, Communication and Technology serves a crucial role in producing students' outcomes. Keher and Suhag (2023) mentioned that the use of these tools help a lot in understanding of students. Hussain, Baig, & Hussain, (2021) talk about the implementation of digital tools to boost learning in Pakistani private schools. According to this research, use of technology enhances the process of learning.

The study of Bond (2020) talks about how flipped classroom learning is being encouraged and gaining popularity due to its positive results towards interactive learning and collaboration. On the other hand, more research is required on how flipped classrooms can be used and increase learners' engagement in classrooms. Collaborative technologies like Google Docs, Google Classroom, and Edmodo were especially linked with the interaction rate. The research work by (Carroll et al., 2019) reveals that the utilization of mobile (technology) has led to a major turn in how pupils learn and what pedagogies should be used in classrooms. Sawang et al., (2017) decided to answer the questions of how a teacher can increase the engagement of a student in a large class. This research tested a model for a classroom integration of technology and it revealed the significant effect of a positive attitude. Moreover, the study also showed a great level of engagement in introverted students. Wang and Chan (1995) claimed that with the use of major technology, this will reduce the human touch and lead to isolation.

The research reveals that it is not easy for a practitioner to keep checking whether all students are engaged in a classroom or not and who is having difficulty understanding the concepts. But there is one way that can improve or eliminate this problem which is the deployment of tech for giving lessons and instructions in the learning spaces. Dong et al., (2017) investigated that it makes it easy for a learner to engage or understand the concept according to his or her feasibility where a learner can pause a lesson if it is recorded for later use. Not only this but this study also researched how introverts and non-introverts give responses through this system of learning. This idea was appreciated by the students as they could pause and engage in the lesson immediately where they needed to.

The study of Prasetyo and Nurhidayah (2021) found that learners find difficulty in learning when there is no use of technology and it directly influences the student's learning outcome. The reason for low learning outcomes can be a lack of learning resources. This study suggests how students' learning outcomes increased after the use of the wireless networks in learning environments. This is also the claim that it increases the cost of hardware, software and training expenses (Kingston, 1992). Spiteri and Rundgren (2018) have aimed to find the factors that affect the teachers of primary grades and their teaching practices integrated with technology. The study found the four factors that include teachers' knowledge, skills and attitude, and culture. After this training, training was encouraged to improve the skills required. The two most influential factors in this area of integration of technology are higher authorities and pedagogues (Robertson et al, 2006). However, it is striking that most of the yearly budget is allocated to the software, hardware and architecture, while the workplace development of principals and teachers is often ignored (Tondeur et al., 2010). Due to the lack of awareness, training, academic guidance, and familiarity of handling technology, many teachers do not use it effectively in the classrooms to enhance the understanding of the students.

According to (Negoescu, 2023), employing technology in the classroom is becoming a global trend these days. Not only students use it for education but also for acquisition of the language. The purpose of the study done by Kaite & Carstens (2021) was to analyze the effect of technology on students' learning. The utilization of digital tools does impact and influence the learning of the students especially the educational games. According to (Youling Li, 2024) learning with educational games is increasing the motivation in learners.

Research Methodology

The primary goal of this study was to examine how tech and digital tools impact primary education in classrooms. The methodology for this research was descriptive survey, where quantitative survey and qualitative interviews both are covered. Moreover, a Quasi-Experimental also bred to see the difference between impact of teaching with the presence of digital tools and without tech. In addition, this was selected to see the intervention difference in the results of both the groups. Mixed approaches help in avoiding overdependence and can capture the soft core views. In addition, it helps in explaining complex social situations. It enables the researchers to combine all the perspectives and hypothesis testing in one single study. Mixed Method approach is helpful in studies such as research involving schools, or studies where researchers might need different perspectives and experiences to counterbalance. Danle (2024) argues that the descriptive survey research is more appropriate for the following reasons:

- It gets easy to generalize the findings in real life settings.
- It is beneficial when it comes to gathering data in large amounts.

The impact of quasi-experiment is seen when two different groups are compared with a specific subject, but with similar characteristics (Dias, 2015).

This study is conducted using a descriptive survey design to evaluate the impact of technology and digital tools in increasing the engagement level of the students in primary grades within Karachi. The descriptive survey method was selected as it allows gathering the data systematically and analyzing it from a targeted population to understand existing practices and their outcomes in real life world academics settings. This method sits well with the objectives set for the study which are to understand the effectiveness of integration of technology/digital tools and how it goes in primary classrooms when it comes to teaching the learners.

For the quantitative, questionnaire survey (Google Form) was designed to conduct survey from teachers and also from parents of primary grade students. Moreover, interview questions were asked from the practitioners who teach primary grade kids to get the deeper insight of them about the engagement level and teaching strategies. Furthermore, to compare the effect of tech/digital tools, two groups were observed in which one was controlled with traditional resources whereas the other (treatment group) was given different tech tools to see the effect of intervention (use of digital tools). This approach was based on an experimental approach where the researcher compared the engagement level in classrooms by implementing blended models with traditional ways of teaching methods. School was selected on the willingness to participate that allowed conducting a research. According to the experts, online surveys are better rather than going in person and meeting them for interview and data collection. Also, onsite surveys consume a lot of time and waste paper. So to avoid these costs and reduce travelling costs, online surveys are the easiest and reliable option.

Population and Sampling

The target population set for this study consisted of the students studying in the primary grade of private school. Teachers and parents of these mentioned sectors were selected specifically to ensure the first-hand experience in the form of quantitative and qualitative data. It also comprised the groups who were observed by the teacher-researcher: One with the presence of technology (Treated Group) and other with the absence of technology (Control Group). The sample size was carefully designed to determine the diverse and reliable data. The population that was included was:

- Teachers: Out of a total of 85 teachers in the selected schools, all were chosen to provide the insights of the classroom's engagement when studying with the digital tool and without tools and technology.
- Students: Two groups were taken to observe. One was controlled and the other was a treated group. The pretest and posttest were administered to see the intervention of the use of technology.
- Parents: 45 parents were taken from the private schools whose kids are studying in primary grades. For the purpose of sampling, the purposive sampling technique was used to select the parents and the teachers. This technique was used because the population was carefully taken that aligns with the research and these people have first-hand experience of the relevant issue.

Research Hypothesis

Hypotheses

H₀: There is no significant effect of using the digital tools and technology on maximizing the engagement of primary grade students in Karachi.

H₁: The use of technology and different digital tools significantly increases the engagement of the students in primary grades as compared to traditional methods.

H₀: Different types of digital tools have varying impact on the engagement level of students in primary classrooms of private schools of Karachi.

H₂: The level of the engagement depends on the tool used in the classroom to teach primary grade students of private schools of Karachi.

Research Instruments

A Mixed-Method approach was taken which combines the quantitative and qualitative research instrument to gather the data comprehensively. A brief questionnaire was developed to evaluate the effectiveness of technology on students' learning in classrooms. There were two questionnaires designed, one for the parents which helped in collecting the quantitative data. Whereas, another questionnaire survey was taken from the teacher which included closed-ended and open-ended questions both. This allowed respondents to freely express their views and measure the data using charts and graphs. The interviews from only teachers were taken out as they are mostly with the students while learning is going on so their point of view is more significant than any other person. Focused group observation was taken out to see the difference when teaching with digital tools and technology and without that. To measure the engagement level, observation was taken, whereas; the score of pretest and posttest were also compared to see the difference between the learning outcomes.

Pilot Study

A pilot study was conducted in one of the private schools catering primary grade students. The pilot study involved 10 teachers, 10 parents and 20 students. Feedback from the pilot study was used to check the instrument, instructions that helped in the final data collection of the study. In addition, it helped to check the validity and reliability of the instrument designed for the research study. Validity of any instrument designed for the data is considered as a crucial element. Content validity was estimated to ensure that the instrument aligns with the goal, objectives and the research questions set for the study.

Table 1: Reliability of the Instrument

Respondents	N of Cases	No of Items	Alpha
Teachers	85	12	0.73
Parents	45	10	0.71

Method of Data Collection

To ensure smooth data collection, the researcher secured the letter from the university to carry out the research in the selected school. In addition, the letter was shown to the principal/head of the department of the school where students were being observed as a part of the study. It was kept in mind to keep confidentiality of the respondents and participants. All the activities were conducted for the observation and the data collection from the teachers and parents.

Ethical Considerations

The researchers followed strict guidelines throughout the research study time. Participants were informed of their rights and confidentiality beforehand and their views were kept anonymous. Researchers made every effort to make participants comfortable in giving their point of views, opinions and suggestions especially regarding the challenges they were facing. Ethical consideration also extended to the acknowledgement of all the sources of information and avoidance of any kind of plagiarism.

Data Analysis

The survey was created by the researchers to explore the challenges and opportunities associated with the integration of technology and digital tools in the classroom setting while the learning process was going on. This research was mainly designed to check the level of the engagement of the students when given lessons with tech rather than using traditional chalk and talk methods. The target audience of survey were teachers associated with the private school teaching primary grade students. The questionnaire designed on Google Forms included multiple choice questions, Likert scale items such as scale rating and star rating and open-ended questions for qualitative data analysis. As this was the mixed-method approach, it included questions as quantitative and qualitative both. The responses received from the teachers were 85 in total. Moreover, there was another survey taken online from the parents whose kids were studying in the private school and were currently enrolled in primary grades from Grade III to IV to take the point of view of the parents whose kids were learning through digital tools and online platforms for their better understanding and engagement. This parent-focused Google Form survey was taken from approximately 45 parents and was entirely based on quantitative data collection. Furthermore, a Quasi-experimental approach was also taken as a part of the research where two groups were observed (control group and treated group) and students of the treated group were provided with the tech-based learning while the other group studied in a control setting. This gave the insight for the comparison between the groups to see their outcomes and engagement level.

Discussion

Findings of the Research

This study was based on the effect of technology in maximizing the engagement of primary grade students in the classroom. Findings of the research are based on three sections. Section A is the analysis of teachers' quantitative and qualitative data. Section B targeted the parents' quantitative data and Section C is the description of the experimental execution done on two groups (Control and Treated Group) which targeted the students studying in primary grade private school.

Section A

Data analysis revealed that most teachers who responded were holding the experience of overall more than 5 years, and that population was (61.9 %). Whereas, (8.3%) teachers had been teaching in schools for 3-5 years, (17.9%) for 1-3 years and (11.9%) for less than 1 year. According to the survey done, (35.7%) primary school teachers used different tools while teaching whereas, (44%) used it on a weekly basis. Moreover, (19%) teachers used digital tools and technology in the classroom to teach primary grade students and (1.2%) never used it. It was revealed from the data collected that on the scale of 1-5, (58.3%) of the teachers rated 5 for the engagement of the students. However, the (16.7%) mentioned the engagement level to 4, (17.9%) believed to have 3, (3.6%) considered 2 and lastly (3.6%) stated 1. It was also found that (40.5%) of the population used interactive whiteboards whereas the (46.4%) population of the responding teachers used tablets/IPads/PCs for learning. Additionally, (54.8%) used educational apps and (44%) used online learning platforms. Not only this, some teachers commented that the tools which they used in their classrooms while teaching are of (1.2%) which included charts, multimedia, projector, slides/PPTs. (51.2%) teachers believed that it had a significant positive impact on engagement, (39.3%) affirmed for moderate positive impacted, and (9.5%) thought neutral on the usage of digital tools for maximizing engagement of the students in learning. However, there was no one who opted to say that it had a negative impact on students' engagement.

According to the survey collected, (65.5%) believed that it engaged highly, (27.4%) that these tools and learning platforms somewhat engaged the students, and (7.1%) were neutral about this statement. Furthermore, no teacher said that the children become disinterested while learning from digital tools. Upon asking the question of how students enjoy learning with fun using digital tools, most teachers rated 5 stars which is (42.9%) of the respondents, (35.7%) rated 4 stars, (11.9%) rated as 3 stars, (1.2%) respondents rated as 2 stars, and (8.3%) as 1 star. Overall, the average rating was 4.04. It was revealed that the majority of the teachers which is (63.1%) rated 5 on the scale of 1-5. While (23.8%) rated 4, (8.3%) rated 3, (2.4%) rated 2 and lastly (2.4%) rated 1 regarding their confidence while using technology effectively in the classroom setting.

The data collected from the online survey revealed that (69%) teachers believe that it is important to give training to the teachers in order to make them learn about integrating technology and updated digital tools in their classrooms. While (21.4%) rated as 4 on the scale of importance 1-5, (7.1%) rated 3, (1.2%) rated 2 and (1.2%) as 1. Here the data survey revealed that (19%) of the respondents believed that the biggest challenge when using technology in the classroom was the lack of training. While, (52.4%) thought that there were insufficient resources available in schools to teach with technology and digital tools. (25%) considered the student distraction as a challenge. Whereas, (63.1%) thought that their teaching with tech hindered when there was limited internet access for the students and the teachers.

Some of the respondents put across their own point of view as well in which (1.2% thought that integrating digital tools was difficult as there was limited time to complete their course while the other (1.2%) believed that if the teacher were teaching with tech tools then examination patterns should also be changed to digital format. Furthermore, the opinion and recommendation of the teachers was taken as a part of interview questions (Qualitative Data) where the theme suggested that most common challenges faced by the teachers were the lack of facilities and resources which included internet facility, multimedia, educational apps, tablet and PCs and other tools. Moreover, the suggestion given by the teachers was to align the curriculum with technological based learning which would make the life of teachers easier too. In addition, opinion was given by the teachers in

the interview that high internet speed was very important and also the technical and financial support from the staff and management. In addition, the teachers' training was very important to keep them updated with the new tools and pedagogies that could be used to engage students and produce better learning outcomes.

Section B

Survey revealed that the parents belonging to the students aged 5-7 years were (31.1%) whereas 8-10 years old children parents respondents were (40%). 11-12 years were from (28.9%). (97.8%) respondents said yes whereas (2.2%) said no on the statement about the internet access at home. Upon inquiring about the use of technology and digital tools in the classroom from the parents of private school primary kids, it was found that (24.4%) children used daily in the classes while (31.1%) used it on a weekly basis. Moreover, occasional users had the amount of (31.1%) whereas (13.3%) said rarely. On the scale of 1-5, majority opted 3 and 4 which is (31.1%) respondents.. Whereas, (20%) said 5, (13.3%) said 2 and lastly (4.4%) 1 for the improvement of their child's learning with integration of tech and digital tools. (20%) parents believed that Tablets and iPads are more effective to engage students in the classroom whereas (48.9%) thought that educational apps are better. (28.9%) considered online learning platforms as the source of engagement while (28.9%) think that interactive boards are better. Moreover, (2.2%) parents mentioned AI Meta and (2.2%) voted for Microsoft Teams.

To rate the attitude towards the learning of students in the classroom. Parents (11.1%) rated 5 which says the highest rating on the scale of positive attitude towards learning through technology. While (31.1%) rated 4, (40%) parents rated 3, (2.2%) 2 and lastly (15.6%) rated 1.

(33.3%) thought that technology had a significant positive impact in producing students' outcomes whereas (53.3%) believed that it had moderate impact. However, there were few parents who believed that it had no impact on learning outcome (4.4%), while (8.9%) believed that technology had a negative impact on learning.

According to the parents of primary grade students whose children were studying in private school, (88.9%) said yes to the statement that their kids enjoyed technology-based tools for school work whereas (11.1%) said maybe. There was no respondent who said no to the statement.

The concern that parents have in their mind regarding technology based learning, (28.9%) think that their kids have become overly dependent on technology.(35.5%) think that their kids have become less socially interactive when they use technology for school work.(48.9%) mentioned this has increased their screen time.(11.1%) considers that there should be limited access to technology at homes.

Section C

Representatives observation was done on the control group and treated group where it was revealed that the treated group had higher engagement level, better learning outcomes, high collaboration among peers in the treated group. In addition, the feedback given by the treated group showed more excitement and active participation. While the other control group was not consistent on the learning, and remained disengaged towards the middle of the lesson due to the use of textbook and verbal instruction in traditional methods. Students were dependent on the teacher-led-instruction. The outcome was revealed when pre-test and post-tests were compared

which showed the noticeable difference between both the groups. Treated group showed higher and better scores as compared to the control group.

Conclusion

The quantitative data collected from the parents and the teachers, alongside observation reveals a strong preference and positive impact of technological-based learning and use of digital tools. Parents believe that their children enjoy learning with the use of technology while studying in the classroom and at home, as they are fully engaged. Same is the point of view of teachers that the results shown by using different educational apps, interactive whiteboard, multimedia etc as students show a positive attitude towards learning and anticipates when there is an integration of new software that leads to active participation and higher engagement and motivation level.

Not only it is revealed from the parents and the teachers that students' outcomes increase when there is an integration of technology and tools, but also the same results were shown when two groups were observed by the researcher to see the intervention result of the tech-based learning versus the traditional old method of teaching. Learners were more engaged, curious, excited, motivated when they were given tools to learn which resulted in better scores after conducting the post-test. The potential barrier that was found while studying for the research is the curriculum designed as it does not integrate the technology in the lessons. Teachers have to make extra efforts to design a lesson according to the new tools. Not only this, but also the training and the workshops are not given every now and then to the teachers to make them aware and learn new skills of using the updated digital tools for teaching. Teachers face a lack of motivation and confidence when they have to integrate something new in the classroom, which they are not familiar with. In addition, the staff should be supportive to provide technical support to the teachers and the students when there is any glitch or issue that should be resolved immediately without disrupting the planned lesson. In addition, many private schools need to fix an amount to invest and maintain their tools/PCs and make it better for the students' usage.

Recommendations

According to the findings obtained and the conclusion researched, the following solutions are forwarded for better improvement.

- Schools should adopt technology as a demand of today's age and methods that include digital tools, applications and software to enhance students' learning outcomes and engagement.
- Educators should be given training and professional development workshops so that they can utilize those effectively in the learning process.
- Offer workshops and meet-ups to the parents that will support them productively at home also.
- Schools should invest in reliable internet access, devices, tools and software to implement the smooth usage of technological resources in the classrooms without any glitch or disruptions.
- Teachers should consider using a blended learning model where they can balance the traditional methods and tech-based learning both which would not result in over dependence on only technology.

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