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RESEARCH PAPER

Exploring the benefits and challenges of using multimedia in primary classroom: A case study in Karachi

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ABSTRACT

The incredible growth and positive development of Information and Communication Technology (ICT) have had a huge influence on almost all walks of life including the field of education. Innumerable technologies have been introduced to make the process of learning easy and efficient. Multimedia projector is one of the most commonly used tools in 21st-century classrooms. It helps in delivering information in an easy, efficient, and creative way. Following a qualitative method research design, the study explores the perceptions of primary school teachers toward the use of multimedia in classrooms. Thematic analysis approach of Kiger & Varpio was used to create codes and themes for the data.The purpose of the study was to identify the benefits of incorporating multimedia in classrooms at the primary level. Moreover, the current study explored the challenges teachers face while using multimedia in classrooms. The study also investigated the techniques to overcome the challenges of using computer technology in classrooms. The study was conducted in a private school in Karachi and the data were collated from eight primary school teachers. The findings of the study show that most of the primary teachers believe that multimedia technology is an easy, efficient, and cost-effective tool for teaching. It assists in engaging and motivating students; furthermore, it provides opportunities to create a better learning experience for students.

Keywords: Case study, Multimedia, Teaching aids, Technology

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Introduction

The incredible growth and development of technology are being seen everywhere. Technology has even evolved in recent years to include tablet computers, smartphones, applications, blogs, instant messaging, and social networking sites. This development indicates that technology has positively impacted several domains, including the field of education (Simelane, 2014). Pham (2022) stated that Student usage of technology is beneficial, it is essential for students to use technology in their educational process. Different new information technologies, such as multimedia, computers, the internet, and multimedia textbooks, are now used in modern schools (Jalolovna, 2022). Multimedia combines several media types including text (alphabetic or numeric), symbols, images, photographs, audio, video, and animations to improve comprehension or memorization (Abdulrahaman et al., 2020). Multimedia has the potential to enhance the teaching and learning process, boost student-teacher engagement, as well as to inspire, excite, and motivate students. Moreover, with the use of multimedia technologies, students may explore and experience real-world problems (Jancheski & Jancheska, 2022).

Research Objectives

This study was conducted to explore the perceptions and attitudes of primary school teachers towards the use of multimedia in their classrooms., to identify the various benefits of incorporating multimedia in primary classrooms, such as enhanced engagement, improved retention of information, and increased motivation, To identify the challenges faced by primary school teachers in using multimedia in their teaching and how they overcome these challenges and to provide recommendations for the effective use of multimedia in primary classrooms in Karachi based on the findings of the study.

Problem Statement

The reason for conducting this research is to explore the benefits and challenges of using multimedia in primary classrooms in Karachi, Pakistan. While there has been some work done in this area in Pakistan, much of it has focused on the use of multimedia in higher education settings, rather than primary classrooms. This research aims to fill this gap by examining the specific experiences of teachers in primary classrooms in Karachi. By studying the impact of multimedia on student learning and engagement, as well as the challenges faced by teachers in integrating multimedia into their classrooms, in Pakistan.

Research Question

The following research questions, therefore, serve as a guide for the current study:

- What are the perceptions of teachers regarding the importance of multimedia in the primary classroom?

- What are the benefits of multimedia on primary students' cognitive development?

- What are the challenges faced by primary teachers while integrating multimedia in their classrooms?

Significance of Research

The result of this research helps to explore the perception of teachers regarding the benefits and challenges of using multimedia in primary classrooms in Karachi. It can contribute to a better understanding of how multimedia can be effectively integrated into primary education and can inform the development of policies and practices that support the use of multimedia in primary classrooms. It can also provide valuable insights into the experiences of teachers who are using multimedia in their classrooms by understanding the benefits and challenges experienced by teachers, educators can better support the use of multimedia in primary classrooms and improve the learning outcomes of students.

Definition of Key terms

Multimedia: Multimedia has been defined as a mixture of music, text, animation, video, or art that is provided via a computer or another digital platform (Vaughan, 2006; Vagg et al., 2020).

Teaching Aids: To enhance the teaching-learning process and to get the attention of students, teachers use different types of equipment such as videos, models, pictures, toys, and many other objects, which are considered as teaching aids (Iliya et al., 2022).

Technology: Technology refers to the alteration and manipulation of human surroundings through the use of scientific knowledge to achieve practical human goals. Technology encompasses the use of scientific principles to improve the human experience (Britannica, 2022). Educational technology, also known as learning technology, sets up pedagogies along with other technologies, whether on purpose or not.

Almost any technology can, when combined with appropriate pedagogies and other technologies, be used to support or engender learning, although only a small subset of educational technologies are designed and sold for the purpose, such as learning management systems, textbooks, electronic whiteboards, courses, etc (Dron, 2022).

Case study: Gustafson (2017) stated that a case study is an in-depth examination of a person, a team, or a unit with the intention of generalizing findings to other units. The focus of a case study is on a particular unit.

Literature Review

The reason for conducting this research is to explore the benefits and challenges of using multimedia in primary classrooms in Karachi, Pakistan. This section includes a review of the scholarly literature related to the use of multimedia in primary classes to get a better understanding of the research problem.

Importance of Teaching Aids

Teaching aids are tools that assist in the teaching and learning process by making abstract concepts more concrete and understandable. These resources help to make learning more engaging and interactive, enriching the educational setting and making it easier for students to grasp the knowledge being presented. They can include any physical materials or aids that a teacher uses to help students achieve their instructional goals. Overall, teaching aids play a vital role in the effective teaching and learning of any subject in the school curriculum (Yeboah et al., 2019).

ICT in education

Information and Communication Technologies (ICTs) is an umbrella term for a wide range of tools and resources used for the communication, creation, storage, distribution, and management of information. The United Nations Development Program (UNDP) defines ICTs as a set of goods, applications, and services employed in the production, storage, processing, distribution, and exchange of information. ICTs are rapidly becoming a crucial part of the education system, causing educational institutions, administrators and teachers to re-examine their roles and teaching strategies in light of the digital revolution. This shift has enabled students to access new pedagogy and gain knowledge in a vastly different manner (Das, 2019).In recent years, ICTs have become an integral part of our lives, with the potential to significantly enhance the effectiveness

and efficiency of educational systems. They can do this by providing more inclusive education, faster and cheaper access to information, and improved education standards (Sart et al. 2022). The integration of information and communication technologies (ICT) into education has become increasingly important as technical skills are now a key aspect of the curriculum in schools. The use of ICT in education has led to the development of virtual schools and has transformed the teaching and learning environment. New and emerging technologies are being combined with older technologies to make ICT applications in education more effective. Not only does ICT enhance the teaching and learning process, it also gives children the opportunity to use modern technology to improve their self-learning across all subjects. ICT can enrich the teaching and learning experience in all subjects, and in the case of professional education, the use of ICT-related innovations can help learners become more professional, focused, and skilled. The effective use of ICT can simplify the teaching and learning process and provide first-hand information to help youth prepare for global demands and trends. There are many benefits to using ICT in education, and the incorporation of ICT into the educational process is strongly encouraged. Information and Communication Technology (ICT) has played a vital role in ensuring that education is accessible to all, promoting fairness and equality in education, enhancing the quality of learning and instruction, supporting the professional development of teachers, and making education management, governance, and administration more effective and efficient (Batra & Kumar, 2022).

Multimedia as a tool for learning

Multimedia encompasses a wide range of mediums that incorporate text and visuals to convey information. This can include lectures, videos, textbooks, videoconferences, and online learning platforms. Essentially, any form of communication that combines written language with images can be considered multimedia (Noetel et al., 2022).

I. Deeper understanding

Multimedia learning enhances the brain's ability to connect verbal and visual content, leading to a greater understanding and easier transfer of learning to new situations. This is particularly important in today's classrooms as higher-level thinking, problem-solving, and collaboration skills are becoming more essential.

II. Improved problem solving

The use of visual elements such as images, videos, and animations in conjunction with text stimulates the brain and improves student attention and retention. This allows students to more easily identify and solve problems compared to a traditional textbook-only learning environment.

III. Increased positive emotions

Experiencing positive emotions during the learning process can lead to a more proactive attitude and improved learning outcomes. Multimedia instruction can impact students' mood and contribute to a more positive learning experience.

IV. Access to a wide range of information

With the proliferation of technology, students have access to a vast amount of information through the internet and other resources. This makes it easier for them to find and share information and participate in class discussions with confidence.

V. World exploration

Multimedia learning environments allow students to virtually explore places and subjects that may be otherwise inaccessible to them. This can include geography, science, and biology lessons, allowing for virtual field trips and the exploration of rare animals and habitats.

Historical background on the use of multimedia

It is difficult to pinpoint a specific date when multimedia was first used, but it is known that Nolan Bushnell developed the video game Pong in 1972, which is considered to be the first example of multimedia. In 1976, Steve Wozniak and Steve Jobs founded Apple Computer, and in 1981, IBM released the first personal computer. In 1984, the first computer with a graphical user interface was introduced. In 1988, Macromedia was created to facilitate the creation of multimedia presentations, which greatly advanced the field of multimedia. As technology has continued to evolve, multimedia presentations have become increasingly interactive (Ayub & Kiazai, 2021).

Cognitive development

Cognitive development is a type of heuristic education that aims to help students develop their perception, attention, and thinking skills about a particular learning goal. This is achieved through the use of educational methods and strategies that are based on the principles of cognitive psychology. Essentially, cognitive development seeks to help students build their cognitive skills and abilities to better understand and learn new information (Hou, 2022). Cognitive development involves the development of various mental skills and abilities, including attention, processing speed, representational competence (the ability to create and manipulate mental representations of objects or ideas), and memory. These foundational aspects of cognitive development can be assessed in children through tests of attention, processing speed, learning and memory, executive functions (such as inhibitory control, cognitive flexibility, and working memory), and intelligence. These tests can provide insights into children's cognitive abilities and help identify any areas of strength or weakness (Irvine et al., 2022).

CTML (cognitive theory of multimedia learning)

The cognitive theory of multimedia learning (CTML) was proposed by Richard Mayer. According to Mayer's theory, learners are more effective at learning when they are presented with both words and visual components, as this allows them to construct their knowledge by choosing and connecting pieces of visual and verbal information and processing them in long-term memory. This theory is based on the idea of dual coding, proposed by Paivio (1990), which suggests that there are two separate information systems for processing verbal and visual data and that these systems can be integrated into a single mental model. Further explain that this integration allows learners to more effectively process and retain new information (Albus et al., 2021; Kaplan & Gruber, 2022). One of the main benefits of these theories is that they provide a framework for developing interventions to improve learning. These interventions, known as "multimedia design principles," are designed to make learning more effective by reducing extraneous cognitive load, making intrinsic cognitive load more manageable, or by utilizing our dual processing channels. These principles can be useful in improving learning, but it is also important to understand when and how they are most effective to achieve the desired results (Noetel, et al., 2022).

Empirical Studies

This research was conducted by Hussain et al. (2022) at the University of Lakki Marwat in Pakistan, investigated the availability and utilization of multimedia in higher secondary schools in the district of Lakki Marwat and its impact on students' academic achievement. The research design was a survey (descriptive) and the sample consisted of 14 principles, 197 teachers, and 2145 students from all higher secondary schools in the district (N=2356). The findings indicated that the availability and utilization of multimedia are important for the development of the education system and that various stakeholders, including the government, education department, and education officials, have important roles to play in promoting their use.

This research, conducted by Alia Ayub and Abdul-Nasir Kiazai in 2021, examined the impact of multimedia on the teaching-learning process at public sector primary schools (grade 5) in Quetta, Balochistan, Pakistan. The researchers used a mixed method approach, including both qualitative and quantitative data collection, to explore teachers' perceptions of the use of multimedia at the primary level and to assess its impact on students' academic scores. The research design included a pre-test and post-test experimental design, and data was collected from 20 public sector primary schools in Quetta (10 male and 10 female schools), with a sample of 200 students selected randomly from these schools. The findings of the study indicated that multimedia can be a powerful tool for enhancing the teaching-learning process and motivating students to learn.

The research conducted by Shakil et al. (2020) aimed to investigate the impact of multimedia on the academic performance of students at the secondary school level in Peshawar, Pakistan. The main objectives of the study were (1) to determine the impact of multimedia on the academic performance of students at the secondary level and (2) to assess the application of multimedia during class and its impact on student academic performance. The study employed a descriptive research design and included a sample of 20 public schools, 20 heads, 40 teachers, and 40 secondary school students in the Peshawar District. The researchers used a questionnaire as the research instrument and found that multimedia was more effective than conventional teaching methods in improving student performance. Based on these findings, the researchers recommended that the government provide multimedia services to schools.

Research Methodology

Research Design

The purpose for conducting this research is to explore the benefits and challenges of using multimedia in primary classrooms in Karachi, Pakistan. This study used a qualitative research approach, gathering information about the perceptions of teachers concerning the use of multimedia in primary classrooms. The purpose of choosing this research design was to explore and understand the advantages and difficulties encountered when implementing multimedia in primary classrooms.

Sample and Sampling Technique

Purposive sampling was adopted and the data were collected from eight teachers of a primary school in Karachi, Pakistan. Purposive sampling is a kind of non-randam sampling method in which the researcher selects participants based on their relevance to the research aim (Crossman, 2020; Ashiq & Habib 2020).

Research Instrument

The interview guide was used to collect the data. During the interview sessions, the researchers act as a moderator to facilitate the students so that a healthy interaction of participants is maintained. The researcher audio-recorded the responses and wrote notes when required.

Interview: The interview was conducted with primary teachers to learn more about their opinions on the usage of multimedia in the primary level.

Data Collection

Data were collected through personal visits to specific schools and collected the data from primary teachers carefully..

Data Analysis

The data collected through interviews was analyzed by thematic analysis. Thematic analysis is a way of examining qualitative data that involves identifying recurring patterns within the data set, analyzing them, and presenting the findings. It is a method of describing the data, but it also includes the process of interpreting the data by selecting relevant codes and identifying themes (Kiger & Varpio, 2020). Data collected through interviews was interpreted in relation to the research objectives, in order to identify and understand the themes that emerged from the data.

Through this process, the researcher was able to draw conclusions about the benefits and challenges of using multimedia in primary classrooms in Karachi, and to identify areas for further investigation.

Ethical Consideration

The research study was conducted with ethical considerations in mind, and all necessary procedures for data collection were discussed with the appropriate school officials. The consent form included information on how the participants' names and the name of the school were kept confidential, including the use of pseudonyms to ensure anonymity.

Results and Findings

Following are the major themes that were identified about the perceptions of teachers for benefits and challenges of using multimedia in primary classrooms.

Theme 1: Students' Engagement and motivation

Most responses from teachers interviewed favored the use of multimedia in the primary classroom can have a positive impact on student engagement and motivation. Teachers reported that students were more likely to participate in class activities when multimedia was used as a teaching tool. Following are the statements from interviewees highlighting the use of multimedia helps to motivate and engage students.

(Respondent PT 06):

“Students perform better with multimedia in the classroom, student’s interest and involvement increases from use of multimedia. It increases the engagement of students in the classroom.”

(Respondent PT 05):

“Educating the child through different modes of technology is very important in today’s world and multimedia is one of them which helps teachers to gain the interest of the child.”

Theme 2: Technology Skills

Multimedia technology has become an essential tool for students in the 21st century classroom. To get information regarding the importance of technology teachers were asked to share their perception about the use of technology in education. A teacher (Respondent PT 03) responding in favor of using technology in education said:
"Technology provides students with access to countless online resources and encourages them to carry out research and therefore they become more independent."

Another teacher (Respondent PT 05) commented:

"Yes, I support the use of technology in education because it helps the students to meet the requirements of the modern world."

Theme 3: Time Management

Effective time management is crucial when using multimedia in the classroom. Incorporating multimedia into lessons can be a great way to engage students but it can be a significant drain on time if not managed properly. Teacher's perception on this was in favor of proper management of time. A teacher (Respondent PT 07) said that:

"Multimedia helps to do task in short period of time and give knowledge if it manage well with a proper planning and resources"

Another teacher (Respondent PT 02) stated that:

"I use multimedia in the classroom but due to lack of availability of multimedia because it is used by all teachers I mostly avoid it."

Theme 4: Teacher Training and Professional Development

Multimedia can be effectively used in the classroom, teachers must be properly trained and have access to ongoing professional development opportunities. They can become more confident and effective in using

multimedia to enhance student learning. Following are some of the responses of teachers:

(Respondent PT 06)

“Yes our school organized training sessions for teachers which help us in utilizing different tools to make learning more creative.”

(Respondent PT 05)

“I attend different training sessions in my schools which help me in improving my teaching skills and effectively engage my students in the classroom.”

Theme 5: Better Learning

Multimedia in the classroom can be a powerful tool for enhancing learning experience, by incorporating multimedia into the classroom, teachers can help students to better understand and retain information. To find out teachers' perception, teachers were asked how they use multimedia to support students' learning needs. Following are some of the responses of teachers.

(Respondent PT 03)

“Teachers with more tools support students in the learning process. Multimedia provides learning resources to learners to receive knowledge and information. It provides information which can be represented through audio, video and animation.” (Respondent PT 05)
”By providing them with different interactive lessons and live worksheets which will help them in learning the specific topic in a better way.”

Theme 6: Clarity in Concepts

The use of multimedia in a classroom can be an effective way to enhance clarity in concept. Teachers' perceptions on this were in favor of multimedia to give clarity in concept. A teacher (Respondent 07) said that:

“Multimedia use to clear the concept and to give the clear understanding about the topicespecially with the help of motivational activities.”

Theme 7: Audio/Visual Channels

According to Mayer's theory of cognitive theory of multimedia (CTML), students can learn better with visual and audio channels. To identify this, teachers were asked to share their opinion about which channel they prefer mostly. Teacher (Respondent PT 02) said that:

"In my opinion the visual sense that is most helpful and effective in the learning process. Visual channels increase interest of learners, provide a clear mental picture, speedup understanding, facilitate memorizing and provide a shared experience."

Theme 8: Technical Challenges

One potential challenge of using multimedia in the classroom may be the need for reliable internet access and the availability of technology in the classroom. Teachers may also face challenges in terms of training and support for using multimedia effectively in the classroom, as well as the need to ensure that all students have equal access to the technology. Following are some responses of teacher regarding the challenges which they face during the use of multimedia:

(Respondent PT 06)

"Many teachers in our school face the lack of availability of resources because multimedia is largely used in our school."

(Respondent PT 02)

"Due to lack of resources it is very difficult to use multimedia in the classroom but I try my best to integrate multimedia in some lessons."

(Respondent PT 04)

"We cannot rely on technology always due to lack of electricity (load shedding) it creates problems."

Discussion

The present research aimed to examine the potential of multimedia to enhance student engagement and enjoyment in the learning process. Through the use of qualitative data analysis, the study found that the use of multimedia in the primary classroom had a positive impact on student engagement and learning experience. Teachers who participated in the study expressed that they observed a marked improvement in student engagement and motivation when multimedia was incorporated into their lesson plans. They also noted that multimedia helped to improve students' learning experience.

However, the study also highlighted some challenges that teachers faced when incorporating multimedia into their teaching, such as limited availability of multimedia resources and power outages (load shedding) that caused disruptions in the classroom.

Therefore, multimedia can be a powerful tool for engaging and motivating students in the primary classroom, it is important to address the challenges that teachers face in terms of resource availability and power stability to fully leverage its potential.

In the previous research by Shakil, et al. (2020) on the impact of multimedia on the academic performance of the students at the secondary level. The research found that the use of multimedia was more effective than traditional teaching methods. This is because the rapid advancement of technology creates opportunities for increased student engagement. The study recommends using multimedia tools with care in the educational process and suggests that they can be used for debate and discussion. Additionally, the study suggests that there is a trend towards updating teaching techniques and incorporating multimedia into the curriculum to improve learning.

Recommendations

In light of the findings from the research on the use of multimedia in primary classrooms in Karachi, the following recommendations are made:

1. Multimedia should be integrated as a fundamental part of basic education, as it can greatly enhance the educational experience for students who have limited exposure to learning materials.

2. there is a need to provide workshops to treachers regarding the Cognitive Theory of Multimedia Learning (CTML) inorder to enhance the efficiency of their lessons.
3. The use of multimedia in classrooms should be made on a regular basis or at least three times a week, as it helps to communicate knowledge through the use of sound and images, which can also increase student motivation.
4. Multimedia is particularly useful for bringing abstract concepts to life and making them more understandable for primary students. Therefore, it should be used to teach these types of concepts.
5. The study should take into account the availability of multimedia and potential conflicts that might arise due to large usage and suggest a schedule be put in place to avoid clashes.
6. Teachers should be provided with training in order to effectively use multimedia in their teaching. This training should also emphasize teaching pedagogy in relation to the use of multimedia.
7. Another potential challenge that schools might face is power outages, so it is suggested that a backup power supply, such as a UPS, be provided to ensure continuity of electricity in schools.
8. Primary schools must be equipped with technology, including multimedia resources, to make the teaching-learning process more effective

Conclusion

The study results have led to the conclusion that utilizing multimedia in primary level classroom instruction is beneficial. It was found that multimedia can effectively engage students and make learning more enjoyable while providing a deeper understanding of complex concepts. Despite challenges such as resource availability and power outages, the results of the study provide evidence for the benefits of using multimedia in primary classroom instruction in Karachi.

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