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RESEARCH PAPER

Exploration of Teaching Practices regarding Use of Digital Tools: An Observational Study

[1]Dr. Azhar Majeed Qureshi, [2]Dr. Shafia Baber and [3]Dr. Tayyibah Roohi

1. Assistant Professor, Department of Science Education, Alama Iqbal Open University, Islamabad, Pakistan
2. Assistant Professor, Department of Education, Superior University, Lahore, , Punjab, Pakistan
3. Visiting Assistant Professor, University of Education, Lahore, Punjab, Pakistan

Corresponding Author azhar.majeed@aiou.edu.pk

ABSTRACT

The objective of this research was to explore how teachers integrate digital tools into their teaching practices. A case study was the chosen research design for the research study. Video recordings of classroom sessions used to monitor the precise teaching strategies, the kinds of DTs used, and the degree of student participation. All Punjabi public-school teachers who were involved in the "e-learn Punjab" project were the study's participants. The primary findings of this study were that science instructor's desire appropriate time to plan for change and to practice the teaching technique through nutrition. Based on the findings of this study, it is recommended to the government to increase funding allocated to schools for the upkeep of digital tools, involve various school stakeholders in the creation of digital content, videos, and lectures, improve the e-learn project and incorporate feedback from teachers implementing it in the real world.

Keywords: Digital Tool, Public Schools, Science Teachers, Teaching Strategies

Introduction

The observational study's examination of teaching strategies for using digital technologies is extremely important for many stakeholders in the educational system. The informative evidence that this study is prepared to supply can be very beneficial to researchers, administrators, and educators in order to maximize the integration of digital resources into instructional practices. Given this, the observational study on digital tool-related teaching practices is crucial for providing useful information that can positively impact professional development programs, instructional strategies, policy formulation, and the wider discourse on educational technology.

Using digital tools (DTs) in teaching practices requires a planned and coordinated strategy (Puig & Morant, 2023). Specialized training, encouraging teaching guidelines, and incorporating DTs into the course curriculum are necessary for effective integration (Shand & Farrelly, 2017). Moreover, DT-related teaching practices include developing strategies for blended and online learning (Katzin, 2020), dynamic learning practices (Mainwaring et al., 2017), and enhancing teacher training regarding the practical aspects of DTs and teaching (Katzin, 2020).

DTs offer a singular opportunity to absorb the best teaching techniques from both in-person and virtual learning environments. Additionally, through DTs, students identify the material to absorb with professors (Fischer et al., 2020). To ensure the reliability of operation, teachers must get extensive training before implementing teaching techniques that incorporate the use of DTs as a unique instructional tool in the classroom (Dessemontet et al., 2019). Last but not least, these instructional strategies call for modifications to teacher supplies, DT capacity, teaching instructions, concerns, and resistance to change (Lawrence & Tar, 2018). According to Fischer et al. (2020), this transformative technique requires that

all curricular content, projects, and evaluation processes be accessible at all times and locations, and that teachers have varied degrees of awareness regarding design thinking.

This viewpoint highlights the part that DTs play in helping learners and teachers move quickly from information to evidence and then to learning (Gurley, 2018). Yıldırım (2017) emphasizes that modifications to the way a classroom is organized might present difficulties for educators as well as students (Shand & Farrelly, 2017). Providing teachers with sufficient preparation and planning for this revolutionary transition is essential to the success of DT implementation (Yıldırım, 2017).

In modern educational contexts, the incorporation of digital tools (DTs) into instructional techniques has gained prominence. To fully capitalize on the advantages of technology-enhanced learning, educators must thoroughly investigate and comprehend the current instruction methods for using digital technologies. Although DTs are known to have the ability to improve teaching strategies, there is a lack of practical understanding about how to use these tools in learning environments. This observational study aims to close this gap by examining the potential and obstacles faced by educators when implementing digital resources into their teaching practices. To investigate the many approaches that educators use to incorporate digital resources into their lesson plans in a range of educational contexts.

Literature Review

In the sphere of education, integrating DTs into lesson plans has gained a lot of attention. The extant body of literature offers significant perspectives on multiple facets of this interaction, such as pedagogical approaches, obstacles encountered by instructors, and the influence of digital resources on student involvement and academic achievements. Prior research has examined a range of instructional practices that teachers use while integrating DTs. Puig & Morant, (2023) stress the value of timely and well-planned specialized training for educators, emphasizing shared knowledge of the objectives of the classroom. Shand and Farrelly (2017) emphasize how digital technologies can be included in course programs, specialized training, and teaching instructions to provide a more unified approach.

The literature explores the teacher preparation and training initiatives for the efficient use of DTs. Katzin, (2020) examine the technical aspects of DTs but also stress the need for rules to be established for online and mixed learning. Willemin emphasizes the significance of training educators to guarantee the dependability of execution (2019). The literature covers educator training and readiness initiatives for the efficient use of digital resources. Dawson and Fitchtman (2018) cover the technical aspects of digital technologies but also stress the need for guidelines to be established for blended and online learning. Dessemontet et al., (2019) emphasized the significance of training educators to guarantee the dependability of execution.

Numerous studies examine the difficulties teachers have when integrating DTs. The difficulties in organizing principles for online and blended learning are covered by Katzin, (2020), along with the technical aspects of digital tool use. Changes in classroom organization can be difficult for teachers and students to adjust to, as Yıldırım (2017) points out. It is crucial to investigate any differences in digital tool-related teaching techniques between educational levels. Shand & Farrelly (2018) highlight the significance of taking into account various educational levels by pointing out that changes in classroom organization may have varying effects.

Research over the last 20 years, both quantitative and qualitative, has demonstrated that barriers may be functioning as internal and external factors (Froese-Germain, Riel, & McGahey, 2013; Gurley, 2018). Examples of external challenges include a lack of technology-based infrastructure in schools (such as access to computers, the Internet, or specific

software programs), time constraints (such as insufficient time available to prepare pedagogy using digital tools), and a lack of technological or pedagogical support (Fischer et al., 2020; Alkhayat, Ernest, & LaChenaye, 2020). According to Hayak & Avidov-Ungar (2020), teachers' intrinsic causes take into account their attitudes toward education and DTs, as well as their involvement in instructional activities and willingness to alter the learning process.

Recently, Hayak & Avidov-Ungar (2020) reported a study that used an alternative approach to identify patterns in teachers' perceptions and attitudes on DTs. They were able to differentiate between four different instructor groups according to their viewpoints. Only one group expressed a negative opinion about the value of employing DTs in teaching and learning, whereas three of the four groups had generally positive attitudes toward it. This group believed that the use of DTs in the classroom was "unnecessary" and that it undermined the authority of the teacher.

As the literature review above has shown, methodological approaches that have been used to identify form in teachers' attitudes and beliefs about implementing DTs in educational settings have been limited to the basic product. Furthermore, a broad perspective is lacking in the existing research on trends in teacher attitudes and opinions, which is restricted to the population of science instructors.

To put it briefly, the body of research on the subject offers a basis for comprehending the nuances of instructional strategies involving the application of DTs. This review guides the investigation of teaching practices in the current observational study and adds to the continuing conversation about successful integration tactics in educational settings.

Material and Methods

The interpretivist perspective guided the current investigation. Because interpretivist paradigms allow researchers to discover meanings and arrive at understandings. The interpretivist paradigm (Kamal, 2019) attested to the multiplicity of realities. According to Kamal (2019), a qualitative study is a methodology for understanding and exploring the connotation persons and groups characteristic to a societal or humanoid problematic. According to Merriam and Tisdell (2015), revealing the significance of reality for those involved in its creation is the aim of qualitative research.

A case study was the chosen research design for the investigation. The case study focused on a group of science teachers in moderate-to-hard courses and examined how they collaborated as a group to explain instructional strategies involving the use of DTs. The experience was included in the case study inside an actual, realistic setting or framework (Elliott, 2018; Yin, 2012). The main approach to gathering data was observation, aided by organized checklists. Video recordings of classroom sessions used to monitor the precise teaching strategies used, the kinds of DTs used, and the degree of student participation. All Punjabi public school teachers who were involved in the "e-learn Punjab" project were the study's participants.

All Punjabi public school instructors, where the "e-learn Punjab" project is still in operation, were the study's participants. More than eight hundred teachers were trained by the Punjab Information Technology Board between 2017 and the present.

Teachers were observed for thirty to forty minutes throughout class; in total, 160 minutes of instruction from four classrooms were watched on camera. A comprehensive collection of observation notes was gathered at the observation site, including with the date, time, and location. The preparation of observation notes was based on issues, teaching resources, instructional strategies, teacher actions, and classroom directions. Additionally, video footage were reviewed in order to corroborate and identify. Re-examining the video

recordings and getting confirmation from participants and the researcher both confirmed the observation notes.

Results and Discussion

Analysis of First Teachers' Observations in the Classroom

Observation 1: During various lecture periods, four observations were made of the first teacher. Her commitment to her pupils and her skillful use of the Digital tool in the classroom were evident from the very first lecture. She asked the kids numerous questions, connected the science topic "Transpiration of Plants," and connected the material to prior knowledge before starting the lesson. Throughout the talk, she repeatedly paused the video to address queries and provide clarification on the subject.

Observation 2: In her second lecture, she started by posing the same query as in the prior one and giving them guidance on various ideas. She then began playing a video that was relevant to the subject and was taken from the e-learn app

Observation 3: The researcher saw that the third lecturer employed digital tool to speed up the students' understanding of the associated ideas. She then demonstrated a transportation simulation using videos. It simplified and made learning fun for the pupils. She also conducted an experiment with a student's assistance. She used cards to give the lesson at the end of the lecture, arranging the cards on the board and allowing the students to ask questions. She had a calm demeanor, paid close attention, and most of her students obeyed her instructions, the researcher said.

Observation 4: During her fourth presentation, the researcher saw that the image disappeared but the audio continued for a short while. It was the problem she ran with when teaching in the classroom

Analysis of Second Teachers' Observations in the Classroom

First observation: Over the course of three distinct lectures, the second participant was watched. She first used questions to elicit prior understanding of the water and oxygen equations from her captivated students (see Appendix A, link 2nd). She helped her pupils with formulating scientific ideas. In response, they talked about the importance of oxygen and water and how these ideas related to the current discussion topic of "Prevention of Corrosion."

Observation 2: She used the e-learn app to play the lecture video during her subsequent lecture. She repeatedly interrupted the film to provide linguistic clarification on the subject for a better understanding. Students initially saw an experiment on video, and she subsequently carried out the identical experiment in front of them.

Observation 3: She used the experiment to define the similarities and differences in her third lesson. This approach to teaching the idea of the similarities and distinctions of high-gains learning was a great example of how to prepare lessons effectively. By asking for their comments, she actively included the kids in the experiment. Information about corrosion prevention was posted by the teacher on the whiteboard.

The instructor then instructed the class to read from the material and highlight the information on the board. The researcher saw that the teacher had prepared exercises to keep her students interested and was skilled at using digital tool. The investigator additionally noted that she circulated the classroom, demonstrating to her pupils her concern for their education and comprehension. Refer to Appendix C for further information.

Analysis of Classroom Observations by Third Science Teachers

Observation 1: The third participant introduced his first experiment, which was related to the subject of the current lecture, "Electromagnetism," by showing an iron attraction experiment

Observation 2: He initiated the video on the e-learn app during his second lecture, repeating the action from his previous lecture. He clarified the various ideas and showed the kids how magnetic forces operated. The researcher saw that although he did a great job using the digital tool in his class, he did not pose any questions to his students during the presentation.

The study found that when students were asked questions instead of given instructions, they began to work and think for themselves as well as take responsibility for their education. He didn't have that in his class.

Fourth Science Analysis of Teachers' Classroom Observation Data

First observation: The instructor began by outlining the subject of "Organic Chemistry" (refer to Appendix A, link 4th). Throughout her presentation, she not only provided students with a thorough explanation of the ideas, but she also thoughtfully addressed their questions and quenched their thirst.

Observation 2: She started her second lecture by connecting the video from her tablet, and she gave an overview of the subject with some instances. She put the film on hold and gave her students the questions. "All right, I think you are on the right track, but I need a little more," the teacher stated sadly. She responded to a question posed by the rest of the class. She listened carefully to the response and asked follow-up questions to get a more detailed definition. She then called a student to hold the object while she gave a thorough explanation of both related and unrelated ideas. She also received feedback from the pupils.

Observation 3: The researcher saw that she actively engaged her pupils by posing questions during the third lecture observation. To ensure that the students understood every subject, she repeatedly updated the lecture. The process of teaching and learning was disrupted by the electrical problem.

Observation 4: She presented a video experiment and performed an experiment in front of the students during her fourth lecture. The researcher saw that she had revised the lecture once more before the finish, and that this way of instructing engaged the pupils and made the course engaging. It was observed that participant four was aware of the value of offering feedback on organic chemistry in addition to using the digital tool .

The results of the observations made in the classroom by science teachers were also used to triangulate the analysis from the aforementioned interview. The investigation looked at how well the instructional activities aligned (suited) with digital tool. Science instructors were able to effectively illustrate this innovative strategy by incorporating it into their instruction and learning procedures. It has been noted that this method aids educators in using digital resources for demonstration. Since students learn conceptually, science teachers' capacity to use digital tool depends on the availability of digital resources. The data also showed that when lecturers connect their material to a video lecture, they become more engaged.

According to Hayak & Avidov-Ungar (2020), operative teaching instructions in the science classroom are achieved when science teachers apply digital tools in their regular teaching practices. These instructions should be doable, transparent, and enthused accessible to address classroom assignments and responsibilities (Shand & Farrelly, 2017).

They added that it saves time, reduces rote learning, and eliminates the need for the board. It was noted during the classroom observation that this technique helps teachers with their instruction by providing them with digital resources such visual aids and video animations, which facilitate their delivery of the lesson. Additionally, scientific teachers were able to handle challenges and problems more quickly because to the internet, animations, presentations, multimedia, offline and online courseware, videos, lectures, and other online and digital resources (Lawrence & Tar, 2018).

As a result, a few participants also remarked that using digital tools for instruction is a lively and effective way to assist students understand difficult concepts. Teachers can effectively communicate complex scientific theories or notions by using this strategy. Additionally, it was noted that the students' subject understanding had increased as a result of using digital tool. The participants reported that using the digital tool has enhanced instruction. If they have already prepared a lesson and connected it to the e-learn project, they will now be more equipped to present a topic. The results corroborated a study that showed secondary science teachers using digital tool can provide an informed environment that starts the learner at the halfway point of the curriculum and involves them in questions as they work to answer more (Lawrence & Tar, 2018; Katzin, 2020; Puig & Morant, 2023). The researcher saw through observations that following the e-learn Punjab project, they are using the digital tools in their classroom.

Every participant acknowledged that using digital tools to educate resulted in improvements to both teaching methods and themselves. According to a study (Mainwaring et al., 2017; Katzin, 2020), Digital instrument prospective to sustenance difference, learner excellent, the efficiency and competence of teachers, prepared considerable reserves to make computers available for learners and teachers. Participants also clarified that the success of digital tool depends on how well it is implemented in the classroom. Regarding digital tool for creative and successful teaching, Bernard calms a structure for viability and is considerate of scientific teachers (Mumtaz et al., 2017).

Anything that calls for a diagrammatic that they are unable to create on the board, for instance. For these lectures, a blended learning strategy is employed. With this approach, they make learning easier for kids by using animations, the majority of which are cartoons. Furthermore, scientific teachers were able to address challenges and issues in a more direct manner with the aid of online and digital resources, which included presentations, animations, multimedia, offline and online courseware, videos, lectures, and the internet (Alkhayat et al., 2020).

Additionally, they talked about what happened to them when we repeatedly displayed a diagram on video. Students' concepts should be clarified since children's perceptions are deeply ingrained in their memories. As such, students would retain information about the subjects that covered in class and be ready for the problem-solving approach used in scientific classrooms (Hayak & Avidov-Ungar, 2020).

They said that teaching topics like the structure of an atom, its shells, the separation between each shell and the nucleus, and the energy gap utilizing digital tool helps students learn and is engaging for them. The idea of science teachers' viability in an educational context where science teachers understand education by the view of their learners and learners understand themselves as their science teachers (Gurley, 2018), is the main focus of international research on the use of digital tools to sustain education.

The ability of science instructors to use digital tool in their classrooms was posed as a question to the principal. Ultimately, the results showed that by employing these resources, science teachers are able to effectively communicate complex scientific ideas or theories. The classroom environment is directly impacted by the viability of science teachers

and the development of accurate instruction and practices to meet the needs of students (Lawrence & Tar, 2018).

The teachers of the schools stated that digital tool is a special way to teach that makes instruction more enlightening and enables teachers to respond more skillfully. Use of digital tool helped science instructors organize their classrooms and integrate cutting-edge pedagogies into their science lessons (Shand & Farrelly, 2017). They describe it as a multitasking approach where instructors use computers, smart laboratories, and technology to conduct lessons. Teaching and learning are currently impacted by the growth of communication and information technologies (Froese-Germain et al., 2013).

The use of digital tool initiative also resulted in modifications and updates to the teaching process, as it is now necessary for teachers to maintain current pedagogical knowledge and abilities in order to instruct pupils. According to Yildirim (2017), operative teaching instructions in the science classroom are achieved when science teachers incorporate digital tool into their regular teaching methods. These instructions should be doable, understandable, and enthused accessible to address classroom assignment obligations.

The purpose of the video recording was to watch the issues, actions, and methods of instruction while using a digital tool. To systematically and analytically document the science instructors' classroom observations, an observation protocol was created (see to Appendix A). Using the 10 indications of effective teaching techniques listed in the observation instruments, the science classroom was observed. These indicators included: understanding and proficiency with digital tools; using instruction in blended learning courses; using content-specific tools (e.g., software, simulation, graphing calculators, Web tools) to support learning; using digital tools to increase students' interest in courses; explaining them to learners through the use of e-learning applications; having an interest in technology use; using digital tools for online support on instructional technology design; using digital tools to challenge teaching experiences; and using digital tools that conflict with all of the courses.

From the participants' first classroom, it was evident that this science instructor had a strong commitment to her students. In her classroom, she was successfully utilizing the digital tool. The researcher found that a science teacher's capacity to use digital tool depends on the resource, she uses in her classroom. Regarding digital tool in innovative teaching, Mumtaz calmed a structure for viability and was considerate of scientific teachers (Mumtaz et al., 2017).

During the second classroom observation, the researcher saw that participant 2 engaged her pupils by using the inquiry approach to first retrieve past information. In science classes that use the inquiry-based approach, professors provide questions to students (Gurley, 2018), generate conjectures, and have them individually demonstrate scientific claims (Lawrence, & Tar, 2018). She then started using the e-learn app to view the lecture video. She stopped the video multiple times to explain the idea in her mother tongue, Urdu, to ensure that viewers understood it well. As a result, science teachers' roles become less that of the expert and more like that of a guide who helps students think critically about their current practices by asking guided questions (Katzin, 2020) or planning strategically timed scaffoldings (Puig & Morant 2023).

That kind of instruction was an example of well-planned lesson as teaching with similarities and differences is a high-yield approach. It is doubtful if the science teachers will be effective if they do not plan ahead and schedule a proper time to handle the transition (Yıldırım, 2017).

The results of a study conducted by Dziuban et al., in 2018 suggest that teacher viability with regard to digital tool does impact the execution of instructional method. The researcher saw that the teacher in the third classroom utilized the digital tool in his class extremely well. However, the researcher observed that during the presentation, he did not pose any questions to his students.

The study claims that when students are asked questions instead of given instructions, they take responsibility for their own learning and do the thinking and effort. Even though students are involved in the questioning process, the idea is that they will learn scientific knowledge content through inquiry (Katzin, 2020). According to a study, science teachers should mandate that science instruction be conducted using trustworthy science methods and up-to-date understanding of scientific investigations, even though they possess sophisticated scientific thinking (Hayak & Avidov-Ungar, 2020).

The researcher saw that the science teacher in classroom four actively engaged her students by posing questions. These days, the focus of science education is on developing inquiry-based skills, which is why it's crucial to use an inquiry-based approach in the science classroom (Fischer et al., 2020). To ensure that the students understood every subject, she repeatedly updated the lecture.

She started an experiment in front of the class after demonstrating it on film. The researcher claimed that by revising the lecture once more at the conclusion, she had engaged the students and made the session engaging. The classroom environment is directly impacted by the viability of science teachers and their capacity to provide proper instruction and practices to meet the needs of learners (Puig & Morant, 2023).

Conclusion

The researcher noticed that the science teacher in the first classroom had a strong commitment to her students. In her classroom, she was successfully utilizing the digital tool. The researcher found that a science teacher's capacity to use GI as a BL tool depends on the digital tool she uses in her classroom. During the second classroom observation, the researcher saw that Participant 2 engaged her pupils by using the inquiry approach to first retrieve past information. She then started using the e-learn app to view the lecture video. She stopped the video multiple times to explain the idea in her mother tongue, Urdu, to ensure that viewers understood it well.

That kind of instruction was an example of well-planned lesson as teaching with similarities and differences is a high-yield approach. The researcher saw that the teacher in the third classroom did a great job of using the digital tool. However, the researcher observed that during the presentation, he did not pose any questions to his students. The study claims that when students are asked questions instead of given instructions, they take responsibility for their own learning and do the thinking and effort. The researcher saw that the science teacher in classroom four actively engaged her students by posing questions.

The researcher also observed that while using DTs, the scientific teacher's job has evolved from merely imparting knowledge to one of changing the student, with the ultimate objective being to encourage their own initiative and sense of responsibility in creating their own knowledge (see appendix A). Regarding distinguishing between role-shifting in a typical classroom and blended learning, the participants believed that face-to-face instruction gives the teacher greater flexibility in managing various situations.

The usage of DTs in this scenario is distinct since everything is organized in accordance with educational goals. Since any teaching issue can result in demotivation and course abandonment, educators need to be ready to work with digital technologies without losing their ability to inspire students. The primary findings of this study were that science

instructor's desire appropriate time to plan for change and to practice the teaching technique through nutrition. According to Dessemontet et al. (2019), science instructors desired sufficient time to collaborate in order to build cooperative teacher effectiveness. They also desired upkeep and training from trainers.

Recommendations

Undertaking a qualitative investigation concerning the utilization of digital resources in Pakistani public schools might provide crucial perspectives on prevailing methodologies, challenges, and prospects. The results have the potential to influence practice and policy, which will ultimately lead to a more equal and successful use of technology in Pakistani education. These suggestions can help researchers make sure that this important subject is explored thoroughly and effectively. Based on the findings of this study, the government will be recommended to increase funding allocated to schools for the upkeep of digital tools, involve various school stakeholders in the creation of digital content, videos, and lectures, improve the e-learn project and incorporate feedback from teachers implementing it in the real world, comprehend the realities of Pakistani society and work towards resolving issues related to blended learning, and link the examination system with digital tool for better outcomes. This includes providing new and updated knowledge that will help teachers stay current on current affairs and the requirement for regular teacher training to enhance the delivery of content.

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