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RESEARCH PAPER

Investigating the Impact of the Smart Classroom Approach on Girls' Education: Challenges and Opportunities at BUETK

Dr Kiran Hashmi [1]
Zareena Qureshi [2]

ABSTRACT

Girls' education is crucial for personal empowerment and the socio-economic development of a nation. In the digital era, technology has transformed the teaching and learning process, making education more accessible and interactive. Smart classrooms, as technologically advanced learning environments, have been introduced in various universities across Pakistan to enhance educational outcomes. However, the effective integration of technology in these classrooms requires students, especially girls, to be technologically literate. This study explores the impact of the smart classroom approach on girls' education, with a particular focus on their learning experiences, challenges, and levels of engagement. Utilizing a qualitative research design, it employs focused group interviews with 15 female students from computer science and education disciplines at Balochistan University of Engineering and Technology Khuzdar (BUETK). The findings highlight that while smart classrooms offer significant benefits for future education delivery, their success depends on comprehensive teacher training and curriculum redesign for sustainable technology integration. Additionally, technological literacy among female students has improved, enabling them to engage more effectively in learning. However, challenges such as limited infrastructure, insufficient teacher training, and socio-cultural barriers persist, particularly in regions like Khuzdar, Balochistan. The study emphasizes the need for a multi-faceted approach to address these issues, ensuring gender equity and the effective utilization of technology in education. By overcoming these challenges, smart classrooms can serve as a powerful tool for enhancing female students' learning experiences and fostering skill development in the modern educational landscape.

Keywords: Digital Literacy, Girls' Education, Smart Classrooms, Teacher Training, Technology Integration

1. Assistant Professor, Institute of Business Management, Karachi
kiran.hashmi@iobm.edu.pk
2. Research Associate, Institute of Business Management, Karachi
zareena.qureshi@iobm.edu.pk

Introduction

Technology has significantly transformed education, continuously enhancing the accessibility and efficiency of the teaching and learning process The integration of instructional and communication technology (ICT) in education is a critical area of study, emphasizing the role of technological tools in enhancing teaching methodologies and learning experiences (Hawkridge, 2022). The teacher employs the lecture-cum-demonstration method, effectively integrating the latest educational technologies to enhance classroom instruction. By incorporating tools such as interactive whiteboards, multimedia presentations, and virtual simulations, the learning experience becomes more engaging and dynamic (Kalyani, 2024). For instance, the use of Augmented Reality (AR) allows students to visualize complex scientific concepts, while adaptive learning platforms personalize instruction based on individual progress. According to Ashiq and Habib (2020) students favor technology-based learning due to its vast potential in fostering interactive, self-paced, and collaborative learning experiences. The integration of digital tools not only improves comprehension but also prepares students for a technology-driven world. Smart classrooms are one of the modern teaching classroom features that allows teachers and students to engage in the learning process through technology. When it comes to using technology in the classroom, girls' education also plays an extremely important role, furthermore, it's important that females are technologically literate, or we can say that girls should have an idea of how effectively they can use technology effectively in the smart classroom. Pakistan is among the countries where girls' education remains a significant challenge. A major concern in Pakistani society is the financial responsibility for funding girls' education, as many parents believe they lack the necessary resources and financial means to support their daughters' schooling. Additionally, mobility restrictions and societal norms often limit girls' access to education, as they are only allowed to pursue learning opportunities with parental permission. One of the research studies on girl education highlighted the fact that girls' education is one of the global issues (Sultan, 2023).

Girls' education plays an extremely important role in the social and economic development of the country. If we provide educational opportunities to the girls, the girls will be able to excel in the education and follow their careers and passion effectively. Furthermore, there are many scholarship programs in Pakistan which is specifically focused on providing educational opportunities to Girl's education such as "Scotland Pakistan Scholarship for young women and girls in 2024, this scholarship is specifically target for young girls to receive educational opportunity through scholarship as well. Furthermore, it's also been observed that the higher educational institution in Pakistan has also provide special preference to provide the educational opportunities to girls' education. Moreover, it's really important that providing educational opportunities to girls has a transformative impact on their life as well as their career. Furthermore, this is one of the unique research studies which specifically investigate the impact on smart classroom approach to girls' education. This will be one of the unique research studies that is conducted at Balochistan University of Engineering Technology Khuzdar.

Problem statement

The smart classroom approach is a new modern technological based classroom. this modern classroom framework is already established in developed countries (Somani, 2017). This research project investigates the smart classroom approach

to girls' education as well. It has been observed that the girls are not aware of using the advanced technological tools when it comes to learning the coursework material in the classroom, this is one of the significant problems. The smart classroom approach is a new technological advancement where the teaching and learning process is possible with the effective use of technology in the classroom (Chachar et al., 2023). The smart classroom approach has brought a lot of benefit for teachers as well as students because smart classroom approach is really interesting approach which makes it possible for teachers to teach students even online in far-flung areas who are not able to join in the classroom because of some geopolitical situation that may be happening in their city.

Pakistan has made efforts to promote girls' education at the local level, with many educational institutions offering scholarship programs specifically designed to support female students. From a global perspective, investing in girls' education contributes to the overall development of society (Somani, 2017).

To critically examine the impact of the smart classroom approach on girls' education, assessing how technology-enhanced learning environments influence their academic performance, engagement, and overall learning experience. Additionally, it seeks to identify the specific challenges that girls encounter in smart classrooms, including technological barriers, accessibility issues, and socio-cultural factors that may hinder their effective participation. Furthermore, the research intends to promote awareness regarding the significance of technological skills for girls, emphasizing the need for digital literacy and competency to ensure their active and equitable involvement in modern educational settings. By addressing these objectives, the study aspires to contribute to the development of more inclusive and effective smart classroom practices tailored to support girls' education.

Research Questions

How do smart classrooms impact girls' education?

Why are technological skills essential for girls in smart classrooms?

What challenges do girls encounter in smart classrooms?

This research project title “Investigate the impact of smart classroom approach on girls' education BUETK Khuzdar ‘is really important because its one of the research studies which is conducted on the smart classroom approach in Pakistan. The higher education commission in Pakistan has taken action to establish the smart classroom in different universities in Pakistan, so Balochistan University of Engineering and technology is one of the universities which has established the proper smart classroom features for smooth teaching and learning process considering the technological needs in teaching and learning process.

Literature Review

Technology has really facilitated the teaching and learning process. The teacher uses technology in the classroom where the teacher delivers the lecture in the classroom while using the PowerPoint presentation or using the digital resources effectively in the teaching and learning process. It’s really important that girls need to be aware of using the digital resources effectively in the learning process, its important that the girls need to know to find and search information on the internet effectively in the learning process.

Significance of Educating Girls

The significance of the importance related to educating girls. Educating girls is one of the most important actions that any country could ever take to develop their society. This research has provided the importance of educating girls.

According to the united nation, it's the state responsibility to provide the compulsory education to girls.

The girls 'education ultimately transforms the home, community and the country too. Investing on the women education is something that it contributes to the nation because women have a particular as well as complex way of looking at different perspective which male does not have to see that way, this is why, it's really important to contribute as well as support on the girl's education. This research study highlighted the fact that the ultimate objective of girls' education is the only way that she could transform her career and life overall, (Evans & Yuan, 2022)

Challenges Faced by Girls in Smart Classrooms

There are some significant challenges that the girls could face in the smart classroom, the girls can be unaware of how to use advanced digital tools in the smart classroom. or using the internet effectively in the teaching and learning process, one of the significant challenges that the girls could face in the smart classroom is how effectively.

Girls' technological knowledge

It has been observed that girls from far flung areas have a very limited digital literacy, the girls have a very limited knowledge related to using technology in the learning process. The concept regarding the awareness of technological skills that girls possess is really important, furthermore, it's really important that the girls should have technological knowledge in order to educate themselves effectively in the smart classroom because it's the need of 21 century learning which is all about collaboration, communication and technological skills as well.

Smart classroom

*S*mart classrooms are one of the kinds of modern classrooms which is based on the technological infrastructure which is used for the teaching and learning process as well. The smart classroom is equipped with technology. The teacher really needs to literate with the technology in the teaching and learning process, students who are learning in the smart classroom are advance in using technology effectively. (SAINI & GOEL) .

Recently, higher education commission in Pakistan has established the 100 smart classroom in different universities in Pakistan by considering the importance of technological skills. It has been published in the higher education website

This is the era of modern education where technology is becoming an important tool in the teaching and learning process. Learning is only possible if the students have technological awareness as how to use the internet in order to find the answer to the questions. The learning process is becoming like a collaborative kind of classroom where students and teachers are engaged in learning. The classroom environment seems like a student-centered classroom. Technology is one of the necessary tool in the learning and teaching process too. One of the national professional standards of teachers in Pakistan is that the teacher must be aware of using the instructional and communication technologies in the education (2009).

Previously, the traditional classroom was more focused on the chalk and board where the teacher is more focused on giving lectures to the students. The classroom environment seems like a teacher-centered classroom. The knowledge is focused on textbook oriented. There is a limited awareness of utilizing critical thinking skills in order to ask open ended questions. Furthermore, it has been observed in Pakistan.

Methodology

The objective of this study was to investigate the impact of the smart classroom approach on girls' education, explore the challenges faced by girls in smart classrooms, and raise awareness about technological skills among female students in these settings. This research employed a qualitative methodology, which delves into concepts, ideas, opinions, and experiences (Hammersly, 2012). Focus group interviews were conducted and recorded with female students from educational and computer science backgrounds to gather comprehensive insights.

The qualitative approach provides an opportunity to describe how people are experiencing a particular research issue and provide information about the issue that human beings are facing such as their contradicting behaviors, beliefs, opinions, emotions, etc. By interacting with them in the form of conducting interviews. The uniqueness of this method is also effective in identifying factors such as social norms, socio economic status, and gender role ethnicity.

Sampling

Sampling is a process of selecting a participant from the whole population in our research context because selected or targeted participants are representing a whole population (Douglas, 2022). The purposive sampling technique was utilized in the study. Total 30 female students from computer science and education department were selected as research participants.

Focused Group Interviews

Focus group interviews were utilized as the primary data collection method. A focus group is a form of in-depth interview conducted in a group setting, characterized by specific features such as its purpose, size, composition, and interview procedures (Mishra, 2016). This approach allows participants to freely share their perspectives on the research questions. Focus group discussions offer several advantages, including providing researchers with a deeper understanding of participants' ideas, fostering a friendly and comfortable environment during interviews, and facilitating collaboration by engaging with participants' arguments. A Focus Group Interview guide, adapted from Pujirianto and Haryanto (2024), was employed to gather data from the students.

Data Analysis

Thematic analysis was employed to analyze the data collected through focus group discussions. Thematic analysis is a qualitative method for identifying, analyzing, and interpreting patterns of meaning, or "themes," within data (Clarke & Braun, 2017). This approach involves systematically and logically examining each component of the data to derive meaningful insights. In this study, the data analysis process began with meticulous note-taking during the focus group discussions. Subsequently, the responses were transcribed and organized in an MS Word document. The data was then analyzed and categorized into themes, which are presented in the findings.

Context of this research studies

This research project “investigates the impact of a smart classroom approach on girls' education in Baluchistan University of the Engineering Technology BUETK Khuzdar. this research study was conducted in Balochistan which is one of the provinces in Pakistan. The smart classroom infrastructure and its features is properly established in the Balochistan University. This is one of the kind of modern technological classroom which has totally replaced the traditional classroom approach because in traditional classroom, the teacher uses the textbook and whiteboard only for teaching purposes, whereas the smart

classroom approach is the requirement of modern teaching and learning process because technology is becoming the necessary tool for teaching and learning process, the google and other internet browser is the main source of searching the information and finding out the relevant information. Technology has transformed the teaching and learning process in this 21-century era which is the technological revolution in education

Research ethics involves adhering to a code of conduct that ensures respect for the context and participants involved in a study. Researchers must safeguard participants' privacy and uphold their dignity throughout the research process. This study adhered to the general code of ethics outlined for educational research. Written consent was obtained from all participants prior to the interviews. Participants were fully informed about the purpose of the research and were assured that their information would remain confidential and anonymous, with no details shared beyond the research team. Furthermore, respondents were invited to voluntarily participate in the interview process, ensuring their engagement was entirely optional.

Findings

The purpose of this study was to, identify the challenges encountered by girls in such settings, examine the impact of the smart classroom approach on girls' education and promote awareness of technological skills among female students. Data collected through focus group discussions were analyzed using a thematic analysis approach. The findings of this research highlight distinctive and emerging themes, contributing to the body of knowledge in this area, as outlined below.

The Impact of Socio-cultural Factors on Female Education

The study findings revealed significant societal and cultural barriers that restrict women's access to education and technology in Balochistan. There are Limited educational opportunities for female students Participants highlighted the limited availability of educational opportunities for women in the region. Socio-cultural norms significantly impact girls' access to education. These include restrictions on attending mixed schools beyond primary level and a lack of accessible single-gender schools at higher levels. Furthermore, several factors contribute to low female educational attainment, including cultural practices, financial constraints, limited educational facilities, and a poor educational environment. These limitations significantly impact women's participation in the workforce. Many women are unable to independently select their professions, leading to limited career choices and a decline in professional aspirations. One participant poignantly described how external guidance and pressure in educational choices have eroded her confidence and limited her autonomy.

A significant number of females in Balochistan face multifaceted obstacles that impede the realization of their educational aspirations. These barriers, deeply rooted in socio-cultural norms, not only disrupt their educational trajectories but also have profound implications for their future roles within society. By limiting their access to quality education, these obstacles constrain their active participation in the community and diminish their potential to contribute meaningfully to its development.

While socio-cultural barriers pose significant challenges for female students in accessing and effectively utilizing technology, participants recognized its transformative potential. They acknowledged that technology can serve as a powerful equalizer, empowering women by fostering self-expression, particularly for introverted learners who may find traditional classroom settings

inhibiting.

Technology and Female Empowerment in Baluchistan

Participants recognized technology as an indispensable tool for modern learning, emphasizing its crucial role in developing 21st-century skills, particularly communication and innovation. One student highlighted the transformative potential of technology, stating, "As far as I know, technology can help me grow in any field, but resources and awareness are crucial for effective technology integration." Another participant emphasized the link between technology integration and improved communication skills, stating, "When we integrate technology into the classroom, we not only enhance learning but also develop children's communication skills, enabling them to express themselves more effectively and access better opportunities." Participants observed a shift from traditional teaching methods to more dynamic approaches that utilize visuals and interactive tools, leading to a deeper understanding of concepts.

Participants acknowledged the essential role of technology in cultivating 21st-century skills, including communication, innovation, and critical thinking. They emphasized that technology facilitates a paradigm shift from traditional, teacher-centric methods like "chalk-and-talk" to more modern, student-centered approaches that incorporate demonstrations and interactive teaching methods. This shift fosters active student participation through the utilization of tools such as projectors, diagrams, and videos, rendering the learning process more engaging and interactive.

The utilization of technology tools such as projectors, videos, and diagrams significantly enhance classroom interaction and renders the learning process more appealing. Concurrently, students have developed increased self-reliance in accessing a wealth of resources, including ResearchGate, Google Scholar, and digital libraries, thereby diminishing their dependence on solely relying on teachers as primary sources of information.

The focus group participants observed an increase in student self-reliance fostered by access to learning materials through smartphones and online platforms, which concurrently enhances critical thinking skills. Recognizing a significant gap in teachers' technological proficiency, participants strongly advocated for structured training programs to align pedagogical approaches with contemporary technological advancements. Recommendations included enhancing classroom infrastructure, providing comprehensive teacher training, and emphasizing the integration of both asynchronous and synchronous learning modalities to effectively overcome temporal and geographical limitations.

Challenges of Technology Integration

This study identified several key challenges to effective technology integration in the educational context. Frequent electricity outages and limited internet access significantly hinder the consistent use of technology in classrooms, while navigating the vast and sometimes conflicting information available online can lead to confusion among students. Despite these challenges, the study revealed the growing importance of technology in education. Participants acknowledged the crucial role of technology in cultivating 21st-century skills, including communication, innovation, and critical thinking. They emphasized that technology facilitates a paradigm shift from traditional, teacher-centered methods to more modern, student-centered approaches that incorporate demonstrations and interactive teaching methods.

Participants observed that many teachers rely heavily on traditional pedagogical approaches due to limited knowledge and training in modern technology. To

address this, they strongly advocated for targeted teacher training programs designed to enhance educators' capacity to effectively integrate technology into their teaching practices.

Furthermore, participants envisioned the creation of "smart classrooms" equipped with a range of multimedia tools, facilitating both asynchronous and synchronous learning modalities. These modern learning environments would be further enhanced by robust infrastructure to overcome physical and logistical barriers to education.

Finally, participants stressed the critical need for policy interventions to ensure consistent electricity and internet access, along with the provision of adequate resources to support the effective integration of technology within the educational system. Participants strongly advocated for the integration of technology into the curriculum to effectively cater to the diverse learning needs of all students, including those who benefit from audio-visual and hands-on learning experiences. They proposed a curricular redesign that incorporates technology-based activities, such as collaborative group work, interactive presentations, and engaging assessments, to enhance student engagement and foster deeper learning.

Discussion

Balochistan, Pakistan's largest province, struggles with numerous challenges, including a significant deficit in the quality of education. Despite its crucial role in societal progress, education is often neglected by those in power. According to Durrani and Malik (2024) Balochistan lacks quality education in its educational institutions. A primary concern is the scarcity of qualified and trained teachers. Research by Chachar (2023) underscores the critical gap in teachers' technological proficiency. Focus group discussions revealed a pressing need for structured training programs to empower educators with the skills necessary to effectively integrate technology into their teaching practices. This includes utilizing tools like PowerPoint, projectors, and assessment apps. These findings emphasize the urgent need for investing in professional development for teachers to ensure sustainable technological adoption in education. Participants envisioned a future where smart classrooms overcome geographical and logistical barriers to education, particularly in regions prone to disruptions. They stressed the importance of both asynchronous and synchronous learning modes to ensure continued education despite challenges. The need for robust infrastructure, including reliable electricity and internet connectivity, was repeatedly highlighted, emphasizing the urgency of addressing systemic inequities within the education system. Irshad (2022) highlights the crucial link between faculty performance and factors such as job satisfaction, training & development, compensation & benefits, and working conditions. This research underscores the critical role of faculty members as the backbone of the education system.

This study highlights the transformative potential of technology in education, echoing the findings of Ashiq and Habib (2020). Participants emphasized the crucial role of technology in modern teaching and learning, recognizing its ability to enhance communication, critical thinking, and independent learning skills. However, the study also underscores significant barriers to the effective integration of technology in education, particularly in remote regions like Khuzdar. Unreliable electricity and limited internet access severely hinder the full utilization of technology-enabled learning. This lack of technological equity exacerbates existing educational disparities and hinders the ability of students in

these areas to fully benefit from the transformative potential of technology.

Technology has shifted classrooms from teacher-centered to student-centered environments. Participants reported greater student engagement through tools like multimedia presentations and group activities. Furthermore, technological tools were seen as empowering for introverted students, providing them with alternative means to contribute actively. This aligns with global trends advocating for personalized learning environments.

The discussion highlighted significant gender disparities in technology adoption within the education sector. Female students face unique challenges, including societal and cultural barriers that limit their access to technology and education. These barriers can manifest as restricted access to devices, limited internet connectivity, and societal norms that discourage female participation in technology-related fields. However, the study also recognized the potential of technology to act as an equalizer. By providing access to online learning resources, virtual classrooms, and digital libraries, technology can empower female students to overcome traditional limitations, such as limited access to physical classrooms and qualified teachers. This can foster greater participation in the learning process and promote gender equality in education. These findings align with the research of Gul et al. (2024) which revealed significant marginalization of females in education. Factors such as lack of transportation, early marriages, and malnutrition contribute to high dropout rates among girls. Similarly, Khan (2021) identified key barriers to female literacy in Balochistan, including lack of basic facilities (infrastructure, transport, and textbooks), lack of qualified teachers, low enrollment rates, and financial constraints. Furthermore, societal factors such as parental perceptions and social norms significantly impact female enrollment in educational institutions. Poverty and low-income households also act as significant barriers, limiting access to education and contributing to higher rates of female illiteracy.

Conclusion

This study underscores the critical need for a multi-faceted approach to address the challenges facing education in Khuzdar province of Balochistan, particularly focusing on gender equity and technological integration. While technology offers immense potential to enhance teaching and learning, its effective implementation requires overcoming significant barriers such as limited infrastructure, lack of teacher training, and societal and cultural obstacles, particularly for female students.

Addressing these challenges necessitates a concerted effort from policymakers, educators, and community members. This includes investing in robust infrastructure development, providing comprehensive teacher training programs, promoting gender equality in education, and fostering a supportive learning environment that encourages female participation. By prioritizing these crucial aspects, Balochistan can unlock the full potential of its human capital and pave the way for a brighter future for all its citizens.

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