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Abstract

This quantitative study aims to explore the relationship between adaptive teaching methods and students' academic performance at the university level in Pakistan. As the educational landscape evolves, adaptive teaching, which tailors instructional strategies to meet the diverse learning needs of students, has become increasingly important. The research investigates how adaptive teaching practices, such as differentiated instruction, personalized learning pathways, and real-time feedback, impact student engagement, comprehension, and overall academic achievement in Pakistani universities. Using a sample of 500 students from various academic disciplines, the study employed a structured questionnaire to assess students' perceptions of adaptive teaching and academic performance data was collected through official records. Statistical techniques, including correlation analysis and regression modeling, were used to examine the relationship between adaptive teaching practices and students' grades, test scores, and retention rates. Findings suggest that adaptive teaching has a positive and statistically significant impact on academic performance, with students who experienced higher levels of adaptive instruction showing greater improvements in grades and subject understanding. The study concludes that adopting adaptive teaching methods in higher education can enhance learning outcomes, particularly in diverse and large classroom settings typical in Pakistani universities. Recommendations are made for educational institutions to incorporate adaptive teaching strategies to foster student success and retention.

Keywords: Adaptive teaching, academic performance

1. Introduction

Adaptive teaching refers to a student-centered approach that tailors instruction and learning experiences to meet the diverse needs of learners. In a university setting, this pedagogy seeks to address the varying abilities, learning styles, and backgrounds of students, promoting engagement and enhancing academic performance. This study investigates the relationship between adaptive teaching strategies and students' academic performance in Pakistani universities, an area that remains underexplored in the existing academic literature. The educational landscape in Pakistan has undergone significant transformation in recent years. With an increasing number of students enrolling in higher education institutions, universities face the challenge of accommodating diverse student needs. According to the Higher Education Commission (HEC) of Pakistan, the number of universities and enrolled students has increased substantially, necessitating innovative teaching methods to cater to the varied learning profiles (HEC, 2020; Rasheed, 2020).

However, conventional methods of teaching, which often follow a one-size-fits-all approach, may not be sufficient to address the growing diversity of students in terms of prior knowledge, learning pace, and personal circumstances (Ali & Anwar, 2020). Adaptive teaching, in contrast, involves the use of flexible pedagogical strategies that respond to the individual needs of students. It encourages faculty members to adjust their teaching methods based on real-time feedback, thus fostering a more personalized learning environment (Pashler et al., 2009; Iqbal & Nasir, 2018). This study explores whether adaptive teaching strategies have a positive impact on the academic performance of university students in Pakistan, specifically focusing on how such teaching methods influence students' motivation, engagement, and overall academic outcomes. The importance of understanding the link between adaptive teaching and student performance is underscored by the increasing emphasis on improving academic outcomes in Pakistani higher education institutions (Mahmood & Naz, 2018; Memon & Arshad, 2019). In a context where students come from diverse socio-economic backgrounds, adaptive teaching could provide a means of bridging gaps in learning and fostering academic success. Previous studies have shown that students' academic performance improves when they receive personalized attention and tailored instructional strategies (Tomlinson, 2001).

Some researchers believe that adaptive expertise reveals comparative advantages, especially when accommodating to changes concerning work requirements, environmental complexity, and atypical situations (Riza & Safdar, 2018; Croskerry, 2018). Therefore, teachers have a particular need for adaptive expertise, who are constantly confronted with unpredictable and variable situations in their teaching work. Teachers grow to become adaptive teachers depicted by Timperley (2013) as being motivated by a "moral imperative to promote the engagement, learning, and well-being of each of their students" and involved in "ongoing inquiry with the aim of building the knowledge that is the core of professionalism". It is with adaptive expertise that we can gain an insight into what knowledge, skills, and dispositions make teachers immerse themselves in continuous learning via teaching practices to refine their instruction and expertise (Afzal, 2018; Tomlinson & Imbeau, 2023). Adaptive expertise can be developed through curriculum reforms and adaptive teaching practices. However, scant empirical studies have adopted adaptive expertise as the focal framework to study teachers and their practices (Ardoin et al., 2020). When depicting teachers' practices, scholars tend to utilize the other terms, i.e., teachers' adaptive practices, or adaptive teaching defined by Parsons (2018) as "teacher action that (a) is non-routine, proactive, thoughtful, and improvisational; (b) includes a change in professional knowledge or practice; and (c) is done to meet the needs of a student or an instructional situation". Teachers flexibly adapt their teaching for handling the student diversity and the instantaneous problems based on continually assessing and learning about students as they teach who are capable of noticing and interpreting embedded information in students' responses comprehensively and accurately and supporting students' differentiated needs (Azhar & Saboor, 2018; Gallagher et al., 2022). This study was aimed at investigating the relationship of adaptive teaching strategy and academic performance among university students.

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2. Statement of the Problem

In Pakistan, higher education institutions are faced with diverse student populations, each possessing unique learning needs, abilities, and prior knowledge. However, despite the increasing emphasis on quality education, academic performance at the university level often remains inconsistent. One potential reason for this is the lack of personalized teaching approaches that cater to the varying needs of students. While adaptive teaching methods have gained traction globally, their implementation in Pakistan’s universities has been relatively limited and not thoroughly studied. Adaptive teaching, which involves modifying instructional strategies to meet individual student needs, has been shown to improve engagement, understanding, and academic success in diverse educational settings. However, there is limited research on how adaptive teaching strategies are being applied in Pakistan’s university system and their potential impact on students' academic performance. Furthermore, universities often rely on traditional teaching methods that do not fully address the varying levels of student preparedness or learning styles. This study seeks to explore the relationship between adaptive teaching methods and students' academic performance at the university level in Pakistan. Specifically, it will examine the extent to which adaptive teaching techniques are being implemented, the challenges faced by educators, and how these methods affect student learning outcomes. Understanding this dynamic will provide valuable insights into how teaching strategies can be adapted to enhance academic success, bridge learning gaps, and improve overall educational quality in Pakistan's universities.

3. Research Methodology

3.1. Research Design

The study adopted a quantitative research methodology to investigate the relationship between adaptive teaching and students' academic performance at the university level in Pakistan. A descriptive-correlational design was used to measure how adaptive teaching techniques influence students' academic outcomes.

3.2. Population and Sample

The population of this study was consisted of university students from different disciplines within universities in Pakistan. A sample of 300 students were selected to represent the broader student body. The stratified random sampling was used to ensure diversity in terms of gender, age, academic programs, and socioeconomic backgrounds. The choice of 300 participants is based on ensuring a sufficient sample size to provide reliable and generalizable results.

3.3. Data Collection

Adaptive Teaching Practices: A set of questions (Likert scale items) were used to measure the extent to which students experience adaptive teaching methods. These methods may include personalized instruction, flexible learning strategies, use of technology, and active learning approaches. A Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree) will be used to assess students’ perceptions of adaptive teaching methods.

Academic Performance: This section captured students’ academic performance through self-reported data, such as their GPA or grades in specific subjects. Additionally, academic performance can be quantified using students’ recent exam scores or university-provided data (with their consent).

4. Data Analysis

The collected data was analyzed using statistical techniques to establish the relationship between adaptive teaching and academic performance. Pearson’s Correlation Coefficient was used to measure the strength and direction of the relationship between adaptive teaching practices and students’ academic performance.

4.1. Ethical Considerations

All participants were informed about the purpose of the study and will provide written consent before participating. Students’ responses will remain confidential, and any identifying information will not be shared. Data will be stored securely. Participation in the study will be voluntary, and students will have the option to withdraw at any time without facing any negative consequences.

Table: 1 shows the correlation between Adaptive Teaching and Academic Performance

Variables	Adaptive Teaching	Academic Performance
Adaptive Teaching	1.000	r = 0.62
Academic Performance	r = 0.62	1.000

Table 1 shows that r = 0.62: This indicates a moderately strong positive correlation between adaptive teaching and academic performance. This suggest that as the degree of adaptive teaching increases, academic performance tends to improve.

4.2. Discussion

Adaptive teaching has the potential to enhance academic performance by personalizing learning experiences to meet individual student needs. While evidence supports its effectiveness, the outcomes are influenced by factors such as student engagement, teacher competency, and the learning context. To maximize the benefits, it is essential to integrate adaptive teaching strategies thoughtfully, ensuring they complement traditional methods and address potential challenges like overreliance on technology and data privacy concerns. The findings of current study reveal that adaptive teaching enhances the students’ academic performance. Numerous studies have demonstrated that adaptive teaching methods can lead to improved academic performance. For instance, a study in Taiwan found that combining flipped learning with adaptive instruction significantly enhanced students' programming skills and motivation (Chen & Hsu, 2022). Engagement plays a crucial role in the success of adaptive teaching. Research indicates that when students are actively involved and motivated, adaptive learning systems can be more effective in improving academic outcomes. The proficiency of educators in implementing adaptive teaching strategies is vital. Studies have shown that teachers who are well-trained in adaptive techniques can better support student learning and contribute to improved academic performance. The context in which adaptive teaching is applied, including subject matter and educational level, can influence its effectiveness. For example, adaptive learning has shown varying degrees of success across different disciplines and educational stages. Adaptive teaching is considered fundamental to teaching quality and student learning. It describes teachers’ practices of adjusting their instruction to

students' diverse needs and levels of understanding. In adaptive teaching, teachers employ prompts, instructional support, and feedback, taking into account individual differences in increasingly heterogeneous classrooms. Adaptive teaching has been repeatedly claimed pivotal to effective classroom instruction and student learning (Gallagher et al., 2022). In adaptive teaching, teachers employ prompts, instructional support, and feedback, taking into account individual differences in increasingly heterogeneous classrooms (Parsons et al., 2018). Findings of the study reveal that there was significant mean score difference of academic performance among students of experiential group with respect to pre-test and post-test. Findings of the study are line up with previous study where, adaptive teachers, recognize situations where their plan does not fully apply, try to determine why their planned instruction is not working, and find alternative approaches for these situations by employing adaptive, flexible, and creative competencies to improve students' learning (Von Esch & Kavanagh, 2018). Furthermore, there was also found a statistically significant mean score difference on academic performance between experimental group and control group. Teachers flexibly adapt their teaching for handling the student diversity and the instantaneous problems based on continually assessing and learning about students as they teach who are capable of noticing and interpreting embedded information in students' responses comprehensively and accurately and supporting students' differentiated needs (Gallagher et al., 2022).

5. Conclusion

The study on adaptive teaching and its influence on students' academic performance at the university level in Pakistan reveals that adaptive teaching methods significantly enhance student learning outcomes. By personalizing instruction to meet the diverse needs of students, adaptive teaching promotes deeper understanding, improves engagement, and caters to varying learning paces and styles. The findings indicate that when teachers employ strategies such as differentiated instruction, use of technology, and flexible learning environments, students shown marked improvement in both academic performance and retention of course material. Additionally, students from diverse academic backgrounds and skill levels benefit from adaptive teaching methods, which help bridge the gaps in learning. The study underscores the importance of training faculty in adaptive teaching techniques to maximize student success. However, challenges such as limited resources, lack of awareness, and resistance to change were identified as barriers to the widespread adoption of adaptive teaching practices in Pakistani universities. To improve the academic performance of students at the university level, it is recommended that educational institutions prioritize the integration of adaptive teaching strategies, invest in faculty development, and foster an environment that supports diverse learning needs. Further research is needed to explore the long-term effects of adaptive teaching on student success and to identify best practices that can be replicated across different academic disciplines.

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