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Aisha Naz Ansari

Sadia Muzaffar Bhutta

Sohail Ahmad

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Teacher Professional Education and Student Learning: A Secondary Analysis of Nationwide Data

Aisha Naz Ansari

Research Associate at Aga Khan University – Institute for Educational Development, Karachi.
aisha.naz22@alumni.aku.edu

Dr Sadia Muzaffar Bhutta

Associate Professor, Aga Khan University – Institute for Educational Development, Karachi.
sadia.bhutta@aku.edu

Sohail Ahmad

PhD candidate at Aga Khan University – Institute for Educational Development, Karachi.
Sohail.ahmad2@scholar.aku.edu

Abstract

Professional qualification of teachers is widely recognised instrumental for enhancing students' learning experiences and outcomes. Recently, the introduction of 4-year B.Ed Hons programme was introduced in Pakistan with the intention that it will help in preparing professionally qualified teachers who would not only demonstrate better classroom practices but also contribute to enhancing their students learning. This paper employed a secondary analysis of a nationwide dataset to compare students' performance who are taught by teachers with B.Ed (Hons), B.Ed, and no professional qualifications. Furthermore, this study also present descriptive comparison of classroom teaching practices of these three types of teachers. The sample comprised 15 teachers and 609 students of elementary grades (5, 6 and 8). The data comprised of students' learning outcomes in science and mathematics and their teachers' teaching practices that were gathered through valid and reliable achievement tests and 3-point classroom observation scale, respectively. The analysis was conducted at two levels: first, using descriptive mean comparison of classroom practices across three groups of teachers, separately for both subjects; and second, one-way ANOVA was used to compare the learning outcomes of students in science and mathematics who were taught by three types of teachers (B.Ed hons, B.Ed and no professional qualification). Results revealed that, regardless of subjects, students taught by teachers with B.Ed (Hons) qualification have performed significantly better than their counterparts taught by teachers with no professional qualification and B.Ed qualification. Despite certain limitations of the study, the findings have some implications for overall teacher management policies and practices in the country. This study provides valuable insights for future research exploring the interplay between teaching practices, teacher qualifications, and student learning outcomes on a broader scale.

Keywords: Teacher professional qualification, teaching practices, student learning outcomes, impact of teacher professional qualification, secondary analysis.



Introduction

In recent decades, addressing the academic achievement gap among students has become a pervasive concern globally (Hung et al., 2019; Johnson et al., 2021). This issue has prompted significant attention from scholars, practitioners, and policymakers, leading to the implementation of various reforms in school education (Whitworth & Chiu, 2015). Central among these reforms is the development of teachers equipped with appropriate pedagogical skills to enhance student learning and narrow the achievement gap (Carter et al., 2023; Guskey, 2000). The fundamental promise driving this emphasis lies in the direct influence that teachers exert on student learning outcomes (Alton-Lee, 2003; Nye et al., 2004; Stronge, 2018). Consequently, there is considerable pressure on teachers to engage in continuous learning to ensure their effectiveness in the classroom. Teacher learning is a dynamic and ongoing process encompassing various interconnected opportunities contributing to their professional development whether in pre-service or in-service contexts (Darling-Hammond, 2017; Sancar et al., 2021).

Teacher education programmes worldwide have been designed to foster professionalism among educators, enabling them to become competent and effective practitioners. Pre-service teacher education programmes offer professional learning experiences through activities such as reflection, group discussions, and implementation models like workshops, seminars, coaching, lesson study, or collaborative communities of practice (Darling-Hammond et al., 2009; Popova et al., 2022; Zepeda, 2013). Desimone (2009) emphasizes the importance of professional learning grounded in core conceptual features derived from empirical research, such as content focus, active learning opportunities, coherence, duration, and collective participation. These features are associated with changes in knowledge and practice, and to a lesser extent, changes in student achievement, showing promise for improving student outcomes (Desimone, 2009; Meissel et al., 2016). Such enriched learning experiences can contribute to equipping teachers with modern pedagogical knowledge and skills to address learning challenges in schools effectively.

In recent years, Pakistan has witnessed a paradigm shift in pre-service teacher education programmes. Reflecting on the historical evolution of teacher professional qualifications, it is evident that this journey has undergone significant transformations. Initially, limited to diplomas or short certifications, it evolved into a professional degree



programme known as Bachelor of Education (B.Ed). In line with the recommendations of a rationalisation study sponsored by USAID in 2010, Pakistan introduced a four-year B.Ed (Hons) and a two-year Associate Degree in Education (ADE) in public and private sector universities and teacher education colleges across the country. The B.Ed (Hons) degree encompasses coursework, teaching practice, and educational research aimed at developing both content and teaching skills. A professional teaching degree necessitates mastery of teaching skills and a comprehensive command of content knowledge. It is noteworthy that the introduction of the B.Ed (Hons) programme aimed to align pre-service teacher education with global best practices, with the expectation that professionally qualified teachers in the classroom would enhance teaching quality and improve students' learning outcomes (Ahmad & Ali, 2018). However, amidst these advancements in teacher education, it is imperative to acknowledge the diverse teaching force with different teaching qualifications present in Pakistani classrooms. While the introduction of the B.Ed (Hons) programme signifies a step towards professionalising the teaching workforce, there remains a significant portion of educators who lack formal professional qualifications, particularly in private schools (Bhutta & Rizvi, 2022). This includes individuals without any teacher education qualification, as well as those holding traditional B.Ed qualifications. Recently, the graduates of B.Ed (Hons) have also been joining teaching force in government as well as private schools of Pakistan. The recent proliferation of B.Ed Hons programmes raises questions about their effectiveness compared to standard B.Ed programmes. Therefore, there is a pressing need to investigate and compare the impact of teachers with varying levels of qualifications on students' learning outcomes in Pakistani schools. It is important to highlight that number of studies have been carried out to investigate various aspects of B.Ed (Hons) programmes; however, there is dearth of literature focusing on its impact on students' learning outcomes. Such research could provide valuable insights into the effectiveness of different teacher preparation pathways and inform future policy decisions aimed at enhancing the quality of education in the country. This study aims to bridge this gap and stimulate policy level discussion related to B.Ed (Hons) programme.

This paper utilises secondary analysis of data from a nationwide study, namely the Science and Mathematics Instruction and Learning Outcomes (SMILO) study conducted by Bhutta & Rizvi (2022). This article seeks to compare the academic performance of



elementary grade students (Grade 5, 6, and 8) taught by teachers with different qualifications - B.Ed (Hons), B.Ed, and those without professional qualifications - in the subjects of mathematics and science across Pakistan. Additionally, the paper provides a comparative overview of the classroom practices employed by these three groups of teachers. Based on the findings, the paper discusses policy and practice implications aimed at enhancing teaching practices and improving students' learning outcomes.

The study is guided by the following research questions:

1. Is there a significant difference in the academic performance of elementary school students in science and mathematics when taught by teachers with professional qualifications (B.Ed Hons and B.Ed) compared to those taught by teachers without professional qualifications in Pakistan?
2. How do the teaching practices of professionally qualified (B.Ed Hons, B.Ed) science and mathematics teachers differ from those who have not obtained professional qualifications in elementary school settings in Pakistan?

Review of Relevant Literature

Brief Historical Evolution of Teacher Education

Globally, the teaching profession is recognised for its direct impact on students' learning. It is important to note that teaching has evolved significantly over the years. In the past, teachers acquired content and pedagogy directly from mentors, as exemplified by Plato learning from Socrates (Woodring, 1975). However, in the 19th century, there was a shift in perception, considering teaching as a passive job limited to delivering lectures and monitoring students (Cuban, 1993; Finkelstein, 1989). Consequently, it was believed that teaching did not necessitate any specialised training.

The turning point came in the early 20th century with the emergence of professional training programmes for teachers which emphasised the practical aspects of teaching (Forzani, 2014). Beginning in this era, the Commonwealth teacher training programme aimed to prepare teachers for practice, marking a crucial shift towards recognising the necessity for a more structured approach to teacher preparation (Forzani, 2014). This marked a substantial departure from the earlier passive view of teaching and laid the foundation for



professionalising the teaching profession. In contemporary times, teacher training has become a global imperative. Countries now require teachers to possess professional qualifications before entering a classroom. For example, in many countries there is teaching licensure, whereas teacher education degree/certificate is compulsory in various other countries across the world.

Professional Qualification of Teachers and Students' Learning Experiences

The shift in teacher professional qualification reflects a broader acknowledgment of the multifaceted role teachers play in facilitating student learning (Bold et al., 2017; Keiler, 2018; Popova et al., 2022). This confirms that teachers are crucial facilitators and central figures in a classroom, mentoring students in various ways. According to Vygotsky's theory, children learn by interacting with a more knowledgeable other. In a classroom setting, teachers serve as more knowledgeable ones, who create an environment where students learn from each other using diverse teaching methods (Abtahi et al., 2017). Another theorist Jean Piaget emphasised teaching as facilitation. A teacher is the one who facilitates students in accomplishing learning experiences. With the facilitation and mediation of the teacher, positive learning experiences of students can be witnessed (Selepe & Moll, 2016). Notably, becoming a teacher involves more than just practice; it encompasses understanding the subject, theories, different teaching methods, and students' psychology (Orchard & Winch, 2015). It also involves identifying and addressing student-related matters using research (Cordingley, 2015). Teacher training now includes courses like pedagogies for specific subjects, where trainee teachers learn how students learn (Popova et al., 2022). It is about engaging students in the learning process and empowering them to take responsibility for their learning (Fonteijn, 2014; Popova et al., 2022). The goal is to equip trainee teachers with the skills to ensure student learning in the classroom, addressing their specific needs.

The pivotal role of teacher qualification in student achievement remains a subject of ongoing debate. Some argue that having a qualified teacher significantly influences students' performance in core domains such as literacy and numeracy (Croninger et al., 2007; Đerić et al., 2022). Sources explain teacher qualification as an important factor for student satisfaction more than the experience of a teacher, and student satisfaction is important to uplift their learning (Aslam et al., 2016; Ekmekci & Serrano, 2022). At the same time, others contend that qualifications alone are insufficient; the experience and expertise of the teacher also



matter (Burroughs et al., 2019; Guo et al., 2012). However, an unequal distribution of qualified teachers persists in many places. This disparity, especially in rural areas, results in some schools having either fewer or no professionally qualified teachers. For instance, in Nigeria, qualified teachers often prefer urban cities, leaving rural areas with a lack of quality learning, same is the case in Pakistan (Ali et al., 2023; Taiwo & James, 2015). Thus, it is not just about obtaining qualified teachers; it is also about ensuring that all schools have equal opportunities.

Teacher Education in Pakistan

In Pakistan, despite numerous reform initiatives, plans, and policies, teacher education has made significant developments towards improving student learning outcomes. Enhancing teacher education has consistently remained a fundamental goal and priority within various education policies in Pakistan (Ahmad & Ali, 2018). For instance, the need for trained teaching force was highlighted in the inaugural Education Conference of 1947. Subsequent education policies underscored the importance of strengthening teacher education programmes in the country, where programmes like PTC, CT, and B.Ed were introduced in different occasions.

Furthermore, the 2009 education policy places great emphasis on the provision of professional qualified teachers to the children in classrooms. Keeping in consideration the recommendations of a study by USAID (2006) on situation analysis of teacher education in Pakistan, massive reforms in teacher education were introduced in 2009 onward. One of these reforms was the initiative like Pre-STEP, initially funded by USAID and implemented in collaboration with the Higher Education Commission Pakistan and other key stakeholders, aimed to address these deficiencies. The introduction of the four-year B.Ed. (Hons) and two-year ADE Programmes in selected teacher education institutes marked a concerted effort to eliminate the shortcomings of previous programmes and enhance the quality of teacher education nationwide. Later, the one-year B.Ed programme was also revised in order to make it relevant to the contemporary market needs. Currently, these programmes are being offered by both public and private sectors teacher education institutes, including universities and colleges.

Teacher education programmes in Pakistan have been a subject of considerable scholarly attention due to their critical role in improving students' learning outcomes and



overall quality of education. Research suggests that teacher education programmes in Pakistan face numerous challenges, including inconsistent curriculum standards, limited practical training opportunities, and a lack of focus on pedagogical skills development (Qureshi, & Kalsoom, 2022). This variability in programme quality has led to concerns regarding the competence and preparedness of teachers entering the education system. Similarly, the continuous changes in the policies related to teacher recruitment have been affecting overall status of teacher education in terms of intake and students' interest in the programme. For instance, in KP, the requirement of pre-service qualification is abolished in some provinces (Ahmad & Ali, 2018) that has affected enrolment rate in these programmes. On the other hand, Sindh government launched teaching licensing policy by giving explicit recognition to professional qualification (Ali & Ahmed, 2022) with the objectives to raise the status of teachers in the schools. Despite all these developments, there is hardly any evidence to inform policy regarding the impact of various teacher professional qualification on students' academic performance.

Methodology

This paper employed secondary analysis of a nationwide dataset to compare students' performance in science and mathematics taught by teachers with B.Ed (Hons), B.Ed and no professional qualification in Pakistani elementary schools. The rationale for using secondary analysis of existing data is twofold: first, the dataset's broad scope provides a robust method for representing the entire country and identifying differences among teachers and their students' learning outcomes; second, it aims to contribute to the discourse on the effectiveness of teacher education programmes in Pakistan using large-scale data. This approach is particularly relevant for developing or low-income countries, as it allows for the utilisation of available data to respond to research questions that are useful for policy and practice level decisions. Additionally, it provides researchers with an opportunity to test unexplored hypotheses using secondary analysis methods (Cheng & Phillips, 2014). Before discussing the sample and analyses of this paper, it is imperative to provide a brief overview of the main study from which this data was drawn.

The SMILO Study

This paper has taken the dataset of a nationwide cross-sectional survey generated by the SMILO (Science and Mathematics Instruction and Learning Outcomes) study in 2022 for



secondary analysis. The SMILO study involved a nationwide cross-sectional survey to assess the teaching practices of elementary school teachers and the learning outcomes of their students in Science and Mathematics across both public and private schools. The study stands out for its nationwide sample and the type of data collected by employing the classroom observations and administering students' achievement tests with standardised protocols.

The SMILO study employed a multistage cluster sampling technique to select its sample. In the initial stage, it covered six geographical regions (Punjab, Sindh, Khyber Pakhtunkhwa [KP], Balochistan, Azad Jammu Kashmir [AJK], and Gilgit Baltistan [GB]) in Pakistan. The second stage involved the selection of 25 districts from each region, with the allocation based on the population of the province. In total, 153 schools with equal representation from both public and private schools were sampled in the third stage. Furthermore, all enrolled students from grades 5, 6, and 8 were selected in the fourth stage, and their Science and Mathematics teachers were recruited in the final stage. The SMILO study gathered data on students' learning through valid and reliable Mathematics Achievement Tests (MATs) and Science Achievement Tests (SATs), separate for each target grade. Both tests included items from its sub-disciplines such as Biology, Physics, Chemistry, and Earth Sciences in SATs and Number & Operations, Geometry & Measurement, Algebra, and Information Handling in MATs, along with three cognitive levels (knowledge, application, and reasoning), as per the guidelines of National Curriculum 2006 to ensure alignment with it. Test items included Multiple Choice Questions (MCQs) and Constructed Response Questions (CRQs). All MATs and SATs comprised 30 items, except for grade 5, which had 20 items. The internal consistency of the tools using Cronbach's Alpha was computed for SATs and MATs, revealing a satisfactory range (0.60 to 0.82) for both SATs and MATs across grades. The data were collected using standardised protocols. Students were situated in an examination setup to minimise peer influence, completing each test in 60 minutes under the researcher's supervision. Data collection occurred between October 2018 and January 2020.

Furthermore, the SMILO study assessed teachers' classroom practices in science and mathematics using a structured observation tool (Classroom Observation Scale - COS), adapted from previous research (Bhutta, 2013). The COS, a 15-item rubric (13 items on a 3-point scale and two categorical items), was administered to observe the teaching practices of



target teachers in both science and mathematics. One lesson each was observed using COS to assess various aspects of classroom quality, providing insights into the extent of student and teacher participation in the teaching-learning environment. Demographic data such as teachers' professional qualification was gathered from each participating teacher using a questionnaire.

The Sample for Secondary Analysis

The entire dataset generated by the SMILO study was considered for sample selection. Since this paper focused on students learning outcomes and teaching practices of the teachers with B.Ed Hons qualification, therefore the criteria for selecting the comparable sample for secondary analysis was to have the presence of all three groups of teachers (i.e., teachers without professional qualifications, teachers with B.Ed professional qualifications, and teachers with the new professional qualification - B.Ed Hons.). The frequency analysis of teachers' data from the SMILO study revealed that four geographical regions (i.e., Punjab, Sindh, KP, and GB) had teachers with professional qualifications (B.Ed Hons.). Therefore, the two regions (i.e., Balochistan and AJK) were excluded from the sample for secondary analysis. Further analysis of geographical regions revealed that only two districts of Punjab (i.e., Lahore and Sargodha) and one district each of KP (i.e., Peshawar), Sindh (i.e., Karachi), and GB (i.e., Gilgit) had teachers with B.Ed Hons professional qualifications. Consequently, all other districts from these four provinces were excluded from the sample for secondary analysis. Additionally, to ensure the comparability of the groups for analysis, the SMILO dataset was further broken down into schools from each district. At this stage, two schools from each district, where all three groups of teachers participated, were selected as the sample for secondary analysis.

Interestingly, the subject-wise distribution revealed that all three groups of teachers across districts and school systems were captured in the SMILO data for Mathematics. However, for science, teachers with professional qualifications were only available in the private school system. Notably, the number of teachers with professional qualifications (B.Ed Hons.) was very low, indicating a small proportion of students taught by teachers with this professional qualification. The sample for secondary analysis was selected based on the comparable number of teachers as well as students who are taught by all three groups,



regardless of the system. The summary of the sample for secondary analysis is presented in Table 1.

Table 1. *Sample for Secondary Analysis*

Subjects	Groups	B. Ed Hons.	B.Ed	No PQ	Total
Mathematics	Teachers n (%)	3 (33.3%)	3 (33.3%)	3 (33.3%)	9
	Students n (%)	152 (42%)	100 (28%)	108 (30%)	360
Science	Teachers n (%)	2 (33.3%)	2 (33.3%)	2 (33.3%)	6
	Students n (%)	62 (25.5%)	71 (28.5%)	116 (46%)	249

PQ=Professional qualification; number (percentage)

Table 1 illustrates the sample for the secondary analysis of teaching practices and their influence on students' learning across three groups of teachers. The sample consisted of three groups of teachers (i.e., B.Ed (Hons), B.Ed, and no professional qualification) responsible for teaching science and mathematics to elementary grades. Since the number of teachers from the first group (B.Ed Hons. teachers) was very low, comparable teachers from the same schools were selected. In total, six science teachers and nine mathematics teachers were sampled for secondary analysis, ensuring an equal distribution across the three groups. Similarly, the number of students taught by these three groups of teachers were considered for secondary analysis. In total, the learning outcomes of 609 students were analysed in relation to their teachers' teaching practices, with 249 students in the science and 360 in mathematics courses.

Data Analysis

The SMILO dataset underwent various cleaning procedures. Afterwards, mean scores were calculated for both students' scores in science and mathematics, as well as for teachers' observations. These mean scores were used for comparisons within each science and mathematics category across the three groups of teachers. After confirming that all key assumptions were met, students' scores of the three groups were compared using one-way ANOVA, separately for science and mathematics. Whereas descriptive comparisons were



presented for classroom observation of the three groups. The subsequent section presents the results of these analyses.

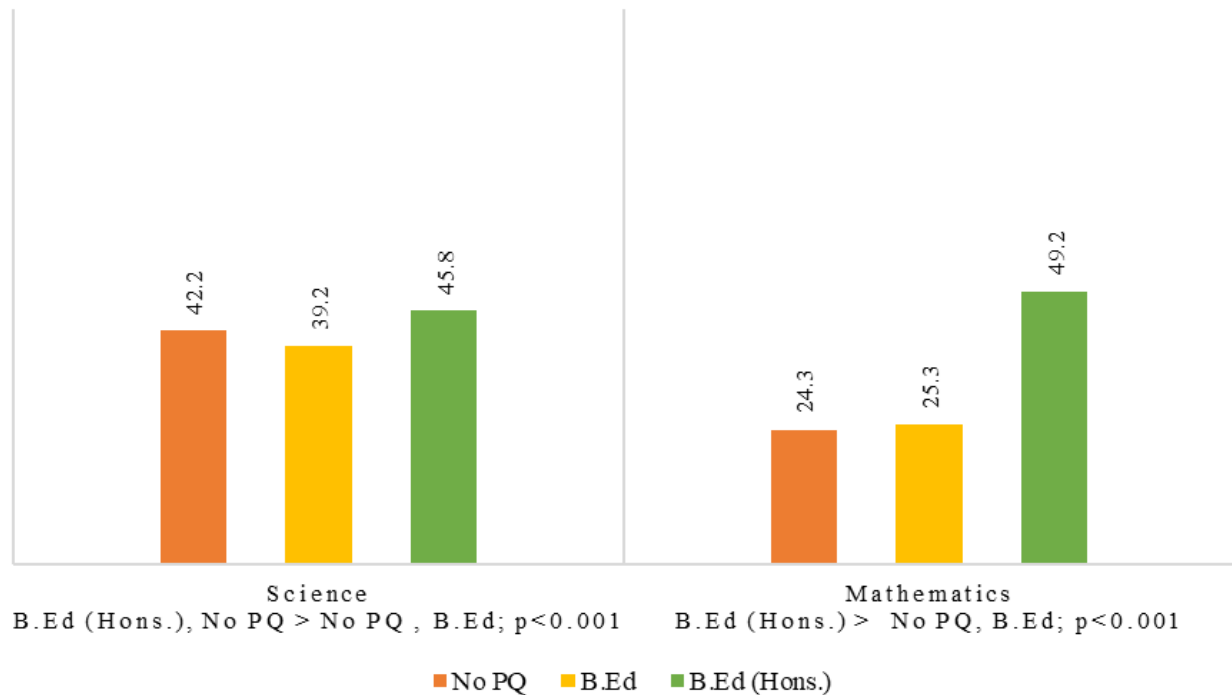
Results

This presents the comparison of students' performance and teaching practices across three groups.

Student Learning in Science and Mathematics across Three Groups of Teachers

Student learning outcomes in science and mathematics across the three groups of teachers were compared and the results are presented in figure 1.

Figure 1 Comparison of Student Learning Outcomes across Three Groups of Teachers



In science, evidently students who were taught by teachers with B.Ed Hons professional qualification ($M = 45.8$; $SD = 13.7$) have performed significantly better ($p < 0.05$) than their counterparts taught by teachers with B.Ed qualification ($M = 39.2$; $SD = 16$). The magnitude of the difference was small ($r = 0.17$). On the other hand, students taught by teachers with B.Ed (Hons) have attained higher scores than their counterparts taught by teachers with no professional qualification ($M = 42.2$; $SD = 12.5$); however, the difference was too small to be significant ($p > 0.05$). Similarly, there was no significant difference in the



performance of students either taught by teachers with B. Ed qualification or no professional qualification ($p > 0.05$).

Furthermore, in mathematics, students who were taught by teachers with B.Ed Hons qualification ($M = 49.2$; $SD = 20$) outperformed their counterparts taught by teachers with B.Ed qualification ($M = 24.3$; $SD = 16$) and with no professional qualifications ($M = 25.3$; $SD = 15.4$). The magnitude of difference was large ($r = 0.56$). On the other hand, there was no significant difference in the mathematics performance of students either taught by teachers with no professional qualification or with B.Ed qualification.

Comparative Overview of Classroom Practices of the Three Groups of Teachers

A comparative overview of classroom practices of teachers with B.Ed Hons., B.Ed, and no professional qualification is descriptively presented due to the small sample size in table 2.

Table 2. Classroom practices of the three groups of teachers

Indicators	Science			Mathematics		
	B.Ed Hons	B.Ed	No PQ	B.Ed Hons	B.Ed	No PQ
Indoor Space	2.0	1.6	1.6	1.0	1.0	1.8
Classroom Arrangements	1.0	1.0	1.5	1.0	1.0	1.5
Classroom Display	1.5	1.0	1.0	1.4	1.0	1.0
Use of Material	1.5	1.0	1.6	1.0	1.0	1.0
Teacher-Child Interaction	3.0	2.0	3.0	2.4	1.4	2.1
Child-Child Interaction	1.5	1.4	2.4	1.6	1.0	1.0
Discipline	1.5	1.4	1.4	2.0	1.4	1.9
Supervision	1.5	1.4	2.0	1.0	1.0	1.3
Active Involvement	2.0	2.4	2.6	1.0	1.0	1.0
Questioning	2.0	1.0	1.6	1.0	1.0	1.0
Peer or Group work	1.5	1.0	1.4	1.0	1.0	1.0
Class Start and Closure	1.5	1.0	1.0	1.0	1.0	1.0
Teacher Instructions	1.5	1.6	2.0	1.8	2.2	1.5
Overall	1.69	1.37	1.77	1.32	1.23	1.32
Mean score on 3-point scale						



In Science: Of the thirteen COS items, science teachers with B.Ed (hons) qualification attained higher rating on seven items as compared to their counterparts with no professional qualification and B.Ed qualification. In *teacher-children interaction* indicated that both groups of teachers (B.Ed Hons qualified and no-professional qualification) interacted with students in a supportive manner most of the time during observation. Generally, teachers demonstrated supportive interaction with their students, but this was not for all the students (e.g., outspoken children were given more attention). *Peer or group work* was another item that B.Ed Hons teachers have attained higher scores as compared to their counterparts. The score indicates that B.Ed Hons teachers attempt to ensure participatory teaching in the classroom by providing collaborative learning opportunities such as peer/group work. To score higher on this particular item, teachers need to set academic tasks to promote interdependence, define expected outcomes, and monitor their learning during the process of group work. One could argue that the existing seating arrangement (in rows) might not allow teachers to facilitate group work/peer interaction in the classroom. While face-to-face seating arrangement could help to maximise peer interaction, the teacher can also use the traditional setup creatively to conduct quality group work in classroom. Even in a traditional setup, students can be facilitated to work on common tasks and share materials. However, all it needs efforts from teachers. Furthermore, the pattern of scoring of indoor space revealed that classes of B.Ed hons teachers were found to be generally cleaner; with sufficient sitting space for students (*indoor space*). Moreover, B.Ed Hons qualified teachers scored higher on the item of supervision indicating their slightly better practices of effective supervision as compared to their counterparts in the other group. *Supervision* does not mean ‘patrolling’ the class and telling students what to do. Conversely, it is to draw on students’ skills and expertise by giving constructive feedback on their work, by acknowledging their efforts, by clarifying tasks and ensuring correct content. Glimpses of this type of supervision during whole class teaching were observed in almost all classroom, where a slightly more prevalence in B.Ed Hons classroom. Furthermore, the teachers with B.Ed Hons qualification was observed to maintain enough control in their classes without using harsh discipline techniques such as corporal punishment or excluding children from activities for a long period of time (*discipline*). As compared to other teachers, in most observations the teachers with B.Ed Hons qualification were observed to make use of some high-order questions to instruct with the trend being stronger for science lessons. In some instances, students were also encouraged



to ask questions to stimulate their learning (*questioning*). Finally, in B.Ed Hons teachers were found slightly better in using a formal 'start' and a formal 'end' of lessons followed by teachers with no professional qualification. However, the third group was hardly making any attempt to make formal start/end of the lesson (*start and closure of the lesson*).

On the flip side, teachers with no professional qualification have demonstrated relatively better practices on five items. A high score on child-child interaction indicated that teachers with either B.Ed Hons or no qualification provide maximum opportunities for interaction among children in science classrooms. In other words, B.Ed Hons teachers were observed providing more opportunities for students to interact with each other for peer learning (*child-child interaction*) against other group of teachers where they provide less opportunities. Another item favoured teacher with no professional qualification was classroom arrangement. *Classroom arrangement* could be defined as one of the categories not directly controlled by teachers but reflecting school policies and norms. Results revealed that generally in classrooms of teachers without professional degree was combination of traditional and group structure. This set up usually facilitates face-to-face interaction among students, which is important for peer learning. Furthermore, the comparison of three groups of teachers' teaching revealed that teachers without professional qualification were relatively good to use basic material (e.g., board and chalk) appropriately as compared to other teachers. Similarly, a relatively higher score *teachers' instruction* displayed better skills in giving clear instructions for subject-related tasks, that students seemed to understand and follow in the classrooms. *Active involvement of children* requires students' engagement in activities through asking and answering questions, problem solving and by demonstrating a certain level of creativity. Some of these requirements were met in many of the classes taught by teachers with no professional qualification and/or B.Ed. The mean score for *child-child interaction* illustrated limited opportunities for interaction among children in science classrooms. However, teachers without professional qualification were observed to be promoting more peer-learning in classrooms as compared to other groups of teachers.

In Mathematics: of the thirteen items, teachers with B.Ed Hons qualification demonstrated better practices in four items as compared to other groups teachers. These includes classroom display, teacher-child interaction, child-child interaction and discipline. On the other hand, teachers with no professional qualification have shown relatively better



practices on three items, namely indoor space, classroom arrangement, and supervision. On the remaining items, all the three groups of teachers were found to be on lower yet same scale. Overall, the results show that B.Ed hons teachers use enough classroom display in order to hook students' attention in particular learning topics. Similarly, B.Ed Hons teachers were observed to be interacting with students in a supportive manner most of the time during observation. The teacher provides careful supervision to the students especially solving mathematics problems and also encourage child-to-child interaction in order to promote collaboration. Overall, these teachers maintained enough discipline in the classroom in order to ensure most students are on-task.

In summary, the descriptive comparison of classroom practices among the three groups reveals a distinct advantage of B.Ed (Hons) qualified teachers over their counterparts with only a B.Ed qualification. However, teachers without professional qualifications also demonstrate similar performance levels to those with B.Ed (Hons) qualifications.

Discussion

The secondary analysis of classroom practices in science and mathematics, categorised across three distinct teacher groups - those with no professional qualifications, those with old professional qualifications (B.Ed/M.Ed), and those with new professional qualifications (B.Ed Hons.) - reveals a notable trend. Teachers with B.Ed (Hons.) generally show improved teaching practices compared to those with B.Ed qualifications. However, there seems no difference between teachers with B.Ed (Hons.) and those without qualifications in mathematics. In science, teachers without professional qualifications sometimes demonstrate better teaching practices.

Regarding student outcomes, those taught by teachers with B.Ed (Hons.) tend to perform better across subjects. This difference is particularly pronounced in mathematics. Surprisingly, there is little difference in student performance between teachers without professional qualifications and those with B.Ed qualifications in both science and mathematics. Despite this, teachers without professional qualifications often exhibit teaching practices of better quality than those with B.Ed qualifications, although this does not always translate into improved student outcomes. Research suggests that while teacher qualifications include both initial education and professional development, the latter, which involves



continuous and formal learning, plays a crucial role in enhancing teaching quality (Klingebiel & Klieme, 2016). Studies have shown that exposure to effective professional learning opportunities can lead to improvements in students' learning outcomes (Warren & Miller, 2013). Furthermore, access to professional development positively impacts teacher professionalism and student achievements (Heafner, 2019). For instance, research indicates that teacher professional learning and experience are correlated with students' progress in literacy and numeracy, particularly in rural and public-school settings (Shukla et al., 2018). The findings of this study corroborate with such evidence showing impact of teacher professional qualification on their students' learning. This could point out to the significance of investing in teacher education and professional development programmes to enhance teaching quality and student success.

This discussion contextualises the role of teacher development in enhancing teaching quality, a crucial aspect aimed at equipping teachers with essential skills for effective teaching. Whether pre-service or in-service, teacher development significantly contributes to creating a conducive learning environment and improving student performance (Colson et al., 2017; Hafeez, 2021). This aligns with existing literature emphasising the importance of teacher development in addressing teaching-learning challenges (Oliveira et al., 2019; Schütze et al., 2017; Ulla, 2018). The comparison between teachers with B.Ed (Hons.) and those with B.Ed highlights the effectiveness of contemporary teacher education programmes in Pakistan. Additionally, the upgrading of teacher qualifications supports the argument that new teacher education programmes offer more comprehensive teacher development opportunities. Rigorous teacher development processes contribute significantly to improved teaching practices and positively influence students' learning outcomes (Tantawy, 2020; Ulla, 2018). This may be because professionally qualified and developed teachers have undergone extensive training and demonstrate enhanced abilities in implementing diverse teaching methods successfully (Saira & Hafeez, 2021). Their ability to apply various teaching techniques is aligned with acquired pedagogical knowledge and skills, leading to higher academic achievements (Wuryaningsih et al., 2019). Professionally qualified teachers with rigorous development processes also exhibit effectiveness in applying diverse teaching techniques (Ololube, 2006; Smith & Gillespie, 2023), suggesting a link between teacher development, teaching methods, and students' academic achievements.



Moreover, the findings are in line with research indicating that students taught by professionally trained and developed teachers tend to achieve better academic results than those taught by teachers without professional training (Nzarirwehi et al., 2019). However, it is important to acknowledge that students taught by teachers with B.Ed (Hons.) qualifications outperform those taught by teachers with no or B.Ed qualifications. This could be because teachers with B.Ed (Hons.) qualifications create a more conducive classroom environment, leading to positive learning outcomes across subjects (Behroz-Sarcheshmeh et al., 2017). Additionally, the positive responses students receive from teachers with rigorous professional qualifications may contribute to their improved learning outcomes (Özüdogru, 2020).

Looking through the lens of teacher development, it can be inferred that teachers without formal professional qualifications may engage in self-directed learning and collaborate with peers during their teaching journey. This is based on the premise that maintaining a professional identity fosters a sense of ownership and continuous development within the profession (Fajardo Castañeda, 2014; Karaolis & Philippou, 2019). It is reasonable to assume that teachers without formal qualifications may have participated in short-term continuous professional development programmes, which could have stimulated their interest, especially if it was their first exposure to such programmes (Faulkner et al., 2019). This stands in contrast to teachers with old B.Ed professional qualifications who may perceive themselves as already knowledgeable, potentially limiting their inclination towards further learning. These insights suggest that teachers' attitudes and readiness play crucial roles in their ongoing professional learning and development (Blunt & Yang, 2002; Stan et al., 2013).

Furthermore, student learning is an intricately complex process influenced by a myriad of factors that extend beyond teacher qualifications and practices. While these aspects are undeniably vital, recent research emphasises the critical importance of adopting a broader ecological perspective (Creemers, 1994). At the school level, factors such as the educational system, leadership dynamics, resource allocation, and overall learning environment play pivotal roles in shaping student outcomes (Ansari & Asad, 2023; Bellibaş et al., 2020; Holzberger & Schiepe-Tiska, 2021; Mohammadpour et al., 2015). Similarly, class-level factors, including class size, classroom climate, curriculum design, and instructional



approaches, significantly influence student learning trajectories (Ainley et al., 2020; Barrett et al., 2015; Blatchford & Russell, 2021). Moreover, teacher-level factors are equally instrumental in determining student learning outcomes, with aspects such as teacher qualifications, experience, and motivation playing key roles (Kirillova et al., 2017; Kwon, 2016; Rus et al., 2016; Say & Bag, 2017; Shcherbakov et al., 2017). Additionally, student-level factors contribute significantly to the learning equation, encompassing elements like learning styles, socioeconomic backgrounds, and parental educational involvement (Hamilton & Hattie, 2022; Kaya & Rice, 2009). This comprehensive understanding underscores the intricate interplay of factors influencing student learning and highlights the necessity of considering these multifaceted dimensions in crafting effective educational strategies. Therefore, it is reasonable to assume that student learning in this study could have been influenced by various school, classroom, teacher, and student level factors. And there is a need to study the impact after accounting for these factors.

Recommendations

The recommendations based on the findings extend to policy, practice, and future research in the field of education. At the policy level, there is a pressing need to reconsider teacher recruitment policies, advocating for the promotion of new professional qualifications over previous ones. This can help ensure that teachers entering the profession are equipped with the latest knowledge and skills necessary for effective teaching. In terms of practice, targeted in-service professional development programmes are essential, particularly for teachers with old professional qualifications. These programmes should focus on enhancing their teaching practices and keeping them updated with current educational methodologies and strategies. Additionally, future research might investigate the interplay between teachers with no professional qualifications, their improved teaching practices, and the resulting impact on student learning outcomes. This can provide valuable insights into how teacher development programs can be tailored to better support teachers without formal qualifications. Lastly, it is imperative to conduct large-scale assessments to thoroughly gauge the impact of new professional qualifications on teachers' practices and students' learning outcomes after accounting for various influencing factors. This can contribute to evidence-based decision-making in education policy and practice, ultimately benefiting both teachers and students alike.



Limitations

This study acknowledges several limitations, and one needs to make cautious inference of the findings. Firstly, the small sample size used for generating results may limit the applicability of our conclusions to broader populations. Secondly, the use of secondary analysis as a research design imposes constraints on the depth and breadth of data available for analysis. This may have implications for the comprehensiveness of our insights into the relationship between teacher qualifications, their teaching practices, and students' learning outcomes. Additionally, the study is limited in terms of not including the voices of teachers themselves. This absence of direct input from teachers may overlook important perspectives regarding their professional experiences and practices. These limitations highlight the need for caution when interpreting and applying the findings of this study and suggest avenues for future research to address these gaps in methodology and data collection.

Conclusion

The secondary analysis of nationwide data has provided valuable insights into the teaching practices and student learning outcomes across different teacher qualification groups. Despite the small sample size, efforts were made to ensure the comparability and representation of teacher groups. The results unfold disparity in teaching practices between teachers with new professional qualifications and those with outdated qualifications in both science and mathematics. Interestingly, while B.Ed (Hons.) qualified teachers exhibited relatively better performance teaching practices compared to those with no professional qualifications and mathematics. However, the consistent pattern in student learning outcomes, with students taught by teachers holding new professional qualifications consistently outperforming their peers regardless of the subject, highlights the importance of teacher qualification in influencing student success. These findings are particularly significant within the context of Pakistan, providing a crucial analysis of the impact of the B.Ed (Hons.) programme initiated in 2010, which had been lacking in previous research. Despite limitations in sample size and research design, this study offers essential insights for addressing gaps in the education system, informing strategic decisions at the policy, practice, and research levels to enhance teaching practices and improve student learning outcomes on a broader scale.



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