

Impact Of Supplementary Materials On Students' Academic Achievement At Primary Level

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ABSTRACT

The study aimed to find out the effect of supplementary materials on the academic achievement of students at the primary level in District Charsadda, KP, Pakistan. This study was conducted using a quantitative research method with a descriptive–correlational research design. All government primary school teachers and students of District Charsadda were the population of the study. A simple random sampling technique was used to select 120 teachers who teach Primary school students. The data were collected by using a structured questionnaire; academic achievement data from students were obtained from schools' academic records and examination score proformas. Statistical tests included frequencies, percentages, means, standard deviations, and correlation analysis. The results of the study showed that many schools had charts and flashcards, worksheets, visual aids, and activity-based teaching materials, but there were no significant differences between urban and rural schools. The study also revealed that teachers felt that supplementary materials were mostly educational and that they generally had a positive perspective on students' learning, participation, motivation, and achievement in the classroom due to the use of these materials. The findings also indicated that supplementary materials at the primary level were positively correlated with the students' learning achievement at the level of significance of 0.05. The study recommended that the provision of supplementary instructional materials, enhancement of teacher training programmes, and the promotion of learner-centred instructional practices in primary schools should be ensured by the government authorities, school administrators, and policy makers, respectively.

Keywords— Supplementary materials, academic achievement, primary education, instructional resources, teaching-learning materials, District Charsadda, learner-centered instruction.

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Introduction

Education has been universally acknowledged as a key tool in individual and social development, as it provides the knowledge, skills, values, and competencies needed to participate in a productive society. Primary education is the stage of formal education that is central in terms of its foundational role for literacy, numeracy, cognitive development, and lifelong learning. The educational standard of students in primary school greatly affects their academic performance and their contribution to the country's socio-economic development. Primary education is regarded as an effective tool for poverty alleviation, social mobility and human capital building in developing countries like Pakistan (UNESCO, 2023).

While there has been significant improvement in enrolment and access to education in Pakistan, there have been ongoing concerns about the quality of primary education. Efforts and policies towards educational reform by federal and provincial governments have mainly concentrated on raising enrolment, revising the curriculum, recruitment of teachers, and infrastructure development. There is, however, empirical evidence that this greater access to schooling has not consistently improved learning outcomes. A significant number of children across the country are unable to meet the grade-level standards in reading, writing, and concepts that are expected in primary school (ASER Pakistan, 2023; World Bank, 2022). This gap between access to education and the quality of the learning experience requires further examination into factors that affect students' learning outcomes at the classroom level.

Classroom instructional practices would be one of the critical factors contributing to the achievement of students. Good teaching is not simply about the delivery of text book content; it is about the application of a variety of teaching strategies and instructional resources that engage learners and help them develop an understanding of concepts. Over the past decades, educational paradigms have shifted from the teacher-centred and towards the learner-centred and activity based learning paradigm, where the students are actively involved in the learning process (Schunk, 2020). In this metamorphosis, supplementary materials have turned into valuable educational tools that help teachers to be effective teachers and improve students' learning outcomes.

BACKGROUND OF THE STUDY

Primary education, according to the National Education Policy (2009), is a basic education stage that serves as the foundation for all children's cognitive development, basic literacy, and basic skills. The policy suggests that gaps at primary can lead to ongoing educational gaps, low academic progress, and increased drop-out rates (Government of Pakistan [GoP], 2009). Likewise, international bodies like UNESCO have stressed that quality primary education is a key component of realizing sustainable development objectives and advocating for equal access to education across the globe (UNESCO, 2023). Despite the introduction of policy measures and the expansion of educational opportunities, issues of learning quality and students' academic performance have persisted in Pakistan.

In the last two decades, significant strides have been made in terms of school enrolments and educational facilities in Pakistan. Access to education has been improved through government initiatives that encourage school attendance, curriculum development, teacher capacity building, and construction projects. However, the results

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in education have not been commensurate. The results of the educational assessments conducted at the national and international levels indicate that a large number of students at the primary level are still struggling to achieve grade-level competencies, especially in literacy and numeracy (ASER Pakistan, 2023; World Bank, 2022). This gap in the educational landscape and in learning outcomes indicates a need to examine practices and factors at the classroom level that affect learning outcomes.

Instructional resources play a significant role among the practices that affect educational quality, as it directly affects the teaching effectiveness and learning process of students. To ensure the creation of effective classroom instruction, teachers should avoid relying solely on textbooks and use a variety of learning resources that can facilitate students' conceptual grasp, engagement and participation. The effectiveness of teaching not only relies on the competence of teachers but also on the quality and variety of learning materials used in the learning process in the classroom (Kabilito, 2024). In this aspect, supplementary materials have gained more and more significance in the present educational context.

Supplementary materials are materials that supplement and augment the use of the prescribed text and are used in the classroom. They can consist of worksheets, storybooks, audiovisual materials, educational charts, models, flashcards, manipulative learning tools, digital applications, and/or multimedia presentations (Tomlinson, 2014). Resources such as these are designed to support learning and to facilitate practice and further understanding of academic concepts. The supplementary materials allow learners to learn in new ways and use student-centered learning methods, which increases learner engagement in learning, rather than just reading material from the textbooks.

STATEMENT OF THE PROBLEM

While there have been significant improvements in access, enrolment in schools, and educational infrastructure in Pakistan over the last few decades, the quality of primary education is a major concern. Despite the step-up in educational participation at the primary school level, students' achievement is not as good as it should be. It is found through national educational assessments that a significant percentage of children in primary schools are not achieving their expected competencies in literacy, numeracy, comprehension, and problem-solving skills (ASER Pakistan, 2023; World Bank, 2022). The continued disparity between access to education and quality of learning indicates that there are factors at the class-level that could have a differential effect on students' learning outcomes and warrant empirical study.

Instructional practices and resources are one of many factors that affect student learning outcomes. Good primary school teaching involves a range of teaching strategies and teaching materials that can support the development of concepts, active classroom engagement and learner engagement. But, the teaching and learning process in most public primary schools in Pakistan remains teacher-centred, textbook-oriented, and memoristic, and lacks interactive learning experience (GoP, 2017). These teaching methods can negatively affect critical thinking, problem-solving skills, and understanding in students.

OBJECTIVES OF THE STUDY

Objectives of the study are as follows:

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- i. To find out the type and availability of supplementary materials used in primary schools of District Charsadda.
- ii. To explore how much teachers rely on supplementary resources in their teaching at the primary level.
- iii. To find out the relationship between the use of supplementary materials and students' academic achievement at the primary level.

RESEARCH QUESTIONS

The following research questions are used in the study:

- i. What kinds of additional materials are there in the primary schools of the District Charsadda?
- ii. How well do teachers use supplementary materials in primary school lessons?
- iii. Is the use of supplementary materials related to students' achievement at the primary level?

SIGNIFICANCE OF THE STUDY

The present study is important for several actors in the educational field, such as teachers, school leaders, educational policy makers, curriculum developers, educational researchers and students. The results of this investigation will be valuable from both theoretical and practical aspects to enhance the quality of primary education, especially in the perspective of District Charsadda.

The findings of this study could be useful for primary school teachers when it comes to the role of supplementary materials in supporting the educational process in the classroom and in increasing students' academic success. The results can assist teachers to grasp the use of various instructional resources to support conceptual learning, student engagement, and cater for various students' learning needs in primary school. Moreover, the study can influence teachers to embrace more learner-oriented and activity-based methods in teaching as per the contemporary teaching and learning approach (Schunk, 2020).

REVIEW OF RELATED LITERATURE

Supplementary Materials are educational materials that are used to augment the required textbooks for teaching and learning. Visual resources include charts, diagrams, maps and pictures; manipulative and activity resources include worksheets, models, flashcards and games; and audiovisual and digital resources include multimedia presentations, educational software and online learning resources (Tomlinson, 2014). These materials help teachers to explain hard concepts, encourage class interaction and enable student diversity in learning styles. Supplementary materials can be particularly useful at the primary level where children may be learning more visually, concretely and experientially.

From the theoretical point of view, supplementary materials can be explained with constructivist learning theory, the theory that has been used to explain the issues of learning through the involvement of the environment and educational experiences. Learning is more effective if students explore and discover instructional content instead of passively memorizing it (Bruner, 1966). Likewise, Jean Piaget believed that abstract concepts should be introduced through concrete experiences, so that children can gain a deeper understanding of their ideas (Piaget, 1972). Modern educational theory also backs these premises, noting that active and multimodal teaching materials have both a

positive effect on students' motivation, engagement, and learning outcomes (Schunk, 2020).

Empirical research in recent years has shown that supplementary materials are effective in significantly improving the academic achievement of students, in terms of their conceptual understanding, class involvement and memory. The study conducted in various educational environments revealed that instructional materials enhance students' engagement and promote a deeper understanding of their subject matter, especially in the disciplines of mathematics, language and science education (Besana et al., 2022; Ahmed et al., 2024). In a similar regard, research has been reported in Pakistan that students' academic performance is enhanced with resource-supported instruction, and it helps to engage them in the class (Rehman et al., 2022; Iqbal & Shah, 2023). This finding indicates that supplementary materials are not only supportive materials but also part of effective classroom teaching.

Traditional lecture-based pedagogies are still being used as the main pedagogical approach in many primary schools of District Charsadda, and textbooks serve as the single source of information. These tend to reinforce rote learning instead of conceptual understanding and restrict opportunities for student interactions and active learning (Ali, 2022). Students' motivation, understanding and performance can be negatively affected by this situation. These can be overcome through supplementary materials, which can help to engage, involve, and support students in lessons. The materials provide visual demonstrations, practical activities and multi-modal instruction which support teachers to translate abstract concepts into meaningful learning.

In addition, socioeconomic differences play a role in determining students' access to educational resources. Students living in low-income families in many developing areas, like District Charsadda, do not have a wide choice of books, technological tools, and out-of-school educational assistance. This shifts the focus of learning to the school, which then serves as the main source of learning materials and opportunities for education (UNESCO, 2023). This lack of provision for supplementary materials in schools could thus deepen inequalities in education and have a detrimental impact on pupils' learning.

Although supplementary materials are becoming more and more important in educational improvement, their accessibility and effective use in many primary schools in Pakistan is lacking. Despite these efforts, they remain constrained in their effective classroom use due to issues like inadequate funding, teacher professional development, institutional support, and resistance to innovative learning approaches (Khan et al., 2023). Furthermore, there is not much empirical evidence that exists in a specific context about the impact of supplementary material on learners' learning outcomes in the context of Charsadda.

RESEARCH METHODS AND METHODOLOGY

The study was carried out within a positivist research paradigm. Quantitative research methodology was used. A descriptive-correlational design was selected.

The population of the present study comprises all those primary school teachers who are actively engaged in the processes of instruction in government primary schools of District Charsadda.

A sample of 120 teachers has been selected through a stratified sampling technique

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from government primary schools of District Charsadda for the present study. As it is the size that gives confidence in statistical results, a sample size of 120 was taken for quantitative descriptive-correlational research analysis so that statistical methods, e.g., correlation and regression analysis, work well statistically (Fraenkel et al., 2019). A sample of 120 respondents was reasonable and feasible for the present study in terms of available time and resources.

Data were collected through a self-developed structured questionnaire as a primary instrument for data collection, which was validated by experts in the field of education. Besides the questionnaire for teachers, the students' academic records were also used as an indicator of the dependent variable. Students' academic records, such as class test scores, end-term examination grades, and other related performance reports maintained by the school, were utilized for the collection of data. The researcher himself collected the data that was analyzed through mean, frequency, standard deviation, and Pearson correlation test.

DATA ANALYSIS AND INTERPRETATIONS

Research Question 1: What type of supplementary curriculum materials is available in the primary school?

Table 1: Availability of Supplementary curriculum materials at the primary school.

Supplementary Material	Mean	SD	Interpretation
Charts and Posters	4.12	0.81	High
Flashcards	3.89	0.94	High
Worksheets	4.21	0.76	High
Storybooks	3.52	1.03	Moderate
Audio-Visual Aids	3.33	1.14	Moderate
Multimedia/Digital Resources	2.94	1.18	Low
Activity-Based Materials	3.84	0.87	High
Overall Mean	3.69	0.96	High

According to Table 1, it shows teachers' responses to the availability of additional curriculum resources in primary schools. Worksheets ($M = 4.21$, $SD = 0.76$) and Charts/posters ($M = 4.12$, $SD = 0.81$) were the most frequently found in the schools as supplementary resources. As well, the availability of Flashcards ($M = 3.89$) and Activity-based resources ($M = 3.84$) have been reported as available resources that the teachers were using on a regular basis in their classroom.

Meanwhile, Multimedia and Digital Resources ($M = 2.94$, $SD = 1.18$) were the least available in the school, as it can be seen in Table 4.4. This could also imply that most of the primary schools (especially rural areas) have technological problems in resource availability.

Research Question 2: How effective is the use of supplementary curriculum materials by teachers in classroom instruction?

Table 2: Teachers' Utilization of Supplementary Curriculum Materials

Statement	Mean	SD	Interpretation
I regularly use supplementary materials during instruction.	4.18	0.79	High
Supplementary materials improve students' understanding of concepts.	4.26	0.73	Very High
I use visual aids to enhance classroom learning.	4.08	0.86	High
Activity-based materials increase students' engagement.	4.14	0.81	High
I integrate supplementary materials into lesson planning.	3.95	0.88	High
Limited resources restrict my use of supplementary materials.	3.72	1.01	High
I receive sufficient training regarding supplementary materials.	3.21	1.13	Moderate
Overall Mean	3.93	0.89	High

Table 2 illustrates teachers' responses toward the usage of supplementary curriculum materials in the classroom instruction. Teachers reported high agreement with the notion that supplementary resources help to increase the understanding of concepts for students ($M = 4.26$, $SD = 0.73$), which indicates that teachers have confidence in the benefit of the resources for instruction. Also, respondents agreed that they use the supplementary resources during instruction ($M = 4.18$, $SD = 0.79$) and the use of activity-based materials is able to boost the students' attention ($M = 4.14$, $SD = 0.81$).

Research Question 3: The association between supplementary curriculum resources and the academic performance of students.

Table 3: Relationship between Supplementary Curriculum Materials and Students' Academic Achievement

Variables	r-value	p-value	Interpretation
Supplementary Curriculum Materials & Students' Academic Achievement	0.684	0.000	Significant Positive Relationship

Table 3 shows the results of the Pearson Product-Moment Correlation analysis performed to investigate the relationship between the use of supplementary curriculum materials and students' academic achievement. The findings indicate a significant positive relationship ($r = 0.684$) between these two variables.

The p-value (0.000) is lower than the 0.05 significance level, which means the relationship is statistically significant. This suggests that greater use of supplementary curriculum materials is linked to improved students' academic performance in primary school.

Table 4: Model Summary for Regression Analysis

Model	R	R Square	Adjusted R-Square	Std. Error of Estimate
1	0.684	0.468	0.463	0.541

In Table 4, the regression analysis summary is presented. From the summary table, we can observe that $R=0.684$ indicates that there is a strong positive association between

supplementary curriculum materials and students' academic achievement. R-squared of 0.468 indicates that almost 46.8 percent of the variance in students' academic achievement can be explained by supplementary curriculum materials. It thus appears that supplementary curriculum materials are an important variable contributing to students' academic achievement in the primary level.

Table 5: Regression Coefficient for Supplementary Curriculum Materials and Students' Academic Achievement

Variable	B	Std. Error	Beta	T	Sig.
Constant	1.842	0.261	—	7.057	0.000
Supplementary Curriculum Materials	0.624	0.062	0.684	10.064	0.000

As stated in Table 5, the regression coefficient shows a positive association, and it is statistically significant ($\beta = 0.684$, $t = 10.064$, $P = 0.000 < 0.05$). Hence, we can conclude that there is a positive relationship, and it contributes to students' academic achievement. Supplementary curriculum materials contribute positively to students' academic achievement as they help to increase academic performance. A positive coefficient indicates that as the use of supplementary curriculum materials increases, academic achievement performance also increases. In the current analysis, a one unit increase in the use of supplementary materials is associated with an estimated increase in academic achievement of 0.624 students.

Findings of the Study

- 1) Instructional materials were plentiful in the form of charts and posters ($M = 4.12$).
- 2) Flashcards were often available and frequently used ($M = 3.89$).
- 3) There was a high level of activity-based instructional materials ($M = 3.84$).
- 4) Schools had a moderate amount of storybooks ($M = 3.52$).
- 5) Moderately available ($M = 3.33$) were audio-visual instructional materials.
- 6) Multimedia and digital learning resources had the lowest amount of availability ($M = 2.94$).
- 7) Overall, teachers gave high ratings for the use of supplementary curriculum materials in classroom instruction (Overall Mean = 3.93).
- 8) Regarding supplementary curriculum materials, teachers strongly agreed that the students' conceptual understanding was improved by the materials ($M = 4.26$).
- 9) Teachers routinely used additional resources when planning their lessons and in their classrooms ($M = 4.18$).
- 10) Teachers agreed that supplementary material has a strong impact on students' engagement and participation ($M = 4.14$).
- 11) The teachers' effective use of supplemental curriculum materials was impacted by insufficient training opportunities ($M = 3.21$).
- 12) Effective use of supplementary materials was negatively affected by the limitation of school funding ($M = 4.16$).
- 13) The large-sized classrooms were negatively related to effective classroom implementation ($M = 4.04$).
- 14) The students' academic achievement was positively correlated with the use of

supplementary curriculum materials ($r = 0.684$, $p = .000$).

Discussion of Findings

The study revealed that supplementary curriculum materials like worksheets, charts, posters, flashcards, and activity-based instructional materials were available in most of the government primary schools. Worksheets, charts, and posters were the most common teaching materials. The discovery indicates that primary school teachers and schools are aware of the value of visual and activity-based learning materials in learning. These materials are made available because of curriculum changes in Pakistan, which focused on a learner-centred approach in the curriculum, especially the Single National Curriculum (SNC).

The results are consistent with those of Ahmed et al. (2024), who concluded that teaching-learning materials play a significant role in enhancing conceptual understanding and participation in the classroom in public primary schools in Pakistan. In the same way, Tomlinson (2014) highlighted the importance of supplemental instructional materials to enhance classroom learning, enabling differentiated instruction and further engagement.

Theoretically, this finding is in line with Constructivist Learning Theory, which posits that children learn more effectively through their involvement in learning activities and real-life experiences (Piaget, 1972). The primary learner is at the concrete operational stage of Piaget, where understanding develops with the use of concrete images and experiences. Thus, in the school, the availability of worksheets, flashcards, and visual aids may help in conceptual learning and hence would enhance the academic outcomes. The results showed that teachers' utilization of materials for supplementary curriculum was high in classroom instruction. Teachers in general felt very positive about the use of supplementary materials to enhance students' conceptual understanding and engagement in class. This means that the teachers appreciate the role of supplementing the curriculum and see it as supportive to teaching and learning.

The conclusion is consistent with the findings of Hussain (2018), who found that the use of effective teaching strategies and supplementary teaching aids significantly influences the interaction in the classroom and performance of students at the primary level in Pakistan. Similarly, Aslam and Kingdon (2011) have found that instructional quality and teaching practices significantly impact achievement outcomes for students in developing educational contexts.

The findings of the study revealed that there is a strong positive and statistically significant relationship between the supplementary curriculum materials and the academic achievement of the students, with $r = 0.684$, $p < 0.05$. The result shows that the usage of supplementary instructional resources is correlated to the academic achievement of primary school students.

The result is consistent with earlier empirical findings, which have shown that quality of instructional materials plays a significant role in improving students' learning outcomes. For instance, Iqbal (2016) concluded that supplementary instructional materials have a positive effect on students' learning performance and academic engagement at elementary school in Pakistan. Likewise, Rehman and Khan (2020) found that activity-based learning resources enhance students' conceptual understanding and academic achievement, especially in the language and mathematics

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subjects.

Limitations of the Study

Firstly, the study was restricted to the government primary schools located in Charsadda. This means that generalisation should not be made to other private schools and other districts of KP and Pakistan, as there are differences in resources, organisational structures, and pedagogy. Secondly, it was a quantitative descriptive-correlational research design, so the investigation was conducted only quantitatively with the numerical data obtained and the statistical relationship of the variables obtained.

Recommendations of the Study

It is recommended that Regular teacher training programmes and/or workshops should be conducted to enhance the skills of teachers in the effective use of supplementary curriculum materials. Moreover, it is suggested that future educational policymakers should pay special attention to the availability of multimedia and digital learning resources, particularly in the government primary schools, where there is limited availability of technological facilities.

It is suggested that further research could be carried out in other districts of KP and Pakistan to see the comparison in other education contexts. There may also be a greater understanding gained through comparative studies of government and private schools with respect to the utilisation of educational resources and educational outcomes. Moreover, more studies may be conducted to follow mixed-method design.

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