

## EFFECT OF FLIPPED CLASSROOM INSTRUCTION ON ENGLISH ACHIEVEMENT AMONG SECONDARY SCHOOL STUDENTS: A QUASI- EXPERIMENTAL STUDY

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### Abstract

*The use of digital technologies has led to an increase in the implementation of student-centered teaching methods, and the flipped class has become a common form of student-centered teaching. But limited empirical evidence was available about its effectiveness in enhancing English language achievement at secondary level in Pakistan. The present study focused on Flipped Classroom Instruction and its effectiveness on the achievement of English learners in the 9th grade, adopting a quasi-experimental research design with pretest and posttest design of an equivalent group. The findings showed that the students with the flipped classroom performed significantly higher than those with the traditional classroom, and that the beneficial effects of the flipped classroom were found in high, average and low achieving students. It was concluded that the flipped classroom was an effective teaching model than teacher centered learning, which encourages active learning, active participation of learners, individualized teaching and learning, as well as improving the interaction between teachers and students.*

**Keywords:** Flipped Classroom Instruction; English Language Achievement; Secondary School Students; Quasi-Experimental Design; Active Learning; Educational Technology; Pakistan.

### Introduction

Educational systems worldwide are increasingly exploring innovative teaching strategies capable of addressing the evolving learning needs of contemporary students. Advances in digital technology, widespread access to online resources, and changing expectations regarding classroom engagement have encouraged educators to reconsider traditional instructional practices. As a result, there has been growing interest in approaches that emphasize active participation, learner autonomy, and the meaningful application of knowledge.

Within this context, the flipped classroom has gained considerable attention as an alternative instructional model. Unlike conventional teaching methods, where content is primarily delivered during classroom lectures and practice activities are assigned as homework, flipped learning reverses this sequence. Students are introduced to instructional materials before attending class through videos, reading, presentations, or other digital resources. Classroom time is then devoted to discussion, collaborative tasks, problem-solving activities, and teacher-guided learning experiences.

The appeal of flipped learning lies in its potential to transform students from passive recipients of information into active participants in the learning process. By relocating direct instruction outside the classroom, teachers are able to dedicate more time to addressing misconceptions, facilitating interaction, and supporting higher-order cognitive activities. This shift aligns with contemporary educational priorities that emphasize critical thinking, communication, creativity, and collaboration.

The relevance of such approaches is particularly evident in English language education. English occupies a significant position within Pakistan's educational system, serving as an important medium of instruction, higher education, and professional communication. Despite

its importance, student achievement in English continues to present challenges in many secondary schools. Traditional teaching practices often emphasize memorization and examination preparation, providing limited opportunities for meaningful language use and active engagement with learning materials.

Given these concerns, identifying instructional strategies capable of improving student achievement remains a priority for educators and policymakers. The flipped classroom offers one possible solution by combining independent learning opportunities with interactive classroom experiences. However, evidence regarding its effectiveness within Pakistani secondary schools remains relatively scarce. The present study was undertaken to examine whether flipped classroom instruction leads to higher levels of English achievement among secondary school students when compared with conventional teaching methods. By focusing on a secondary school context in Pakistan, the study contributes empirical evidence to an area where research remains limited and provides insights into the potential value of technology-supported instructional innovation.

### **Statement of problem**

English language proficiency among secondary school learners in Pakistan continues to pose significant educational challenges. Despite completing several years of formal English instruction, a substantial number of students fail to develop adequate competencies across the four language skill areas reading, writing, listening, and speaking. This persistent underperformance can be traced to multiple contributing factors:

#### **1. Predominance of Conventional Teaching Methods**

English language classrooms across Pakistan remain heavily reliant on traditional lecture-based approaches where teachers primarily deliver content through direct instruction while students assume passive roles as information recipients. This instructional paradigm offers restricted opportunities for meaningful language engagement, interactive practice, and authentic communication, ultimately constraining students' linguistic development.

#### **2. Compromised Educational Outcomes**

The continued use of teacher-dominated instructional strategies has direct negative consequences for student learning. Many learners achieve unsatisfactory scores on standardized examinations, display limited self-assurance when attempting to communicate in English, and face diminished prospects for pursuing higher education and securing professional employment where English competence serves as a prerequisite.

#### **3. Disconnect Between Policy Aspirations and Classroom Realities**

Although recent educational policy frameworks and reform initiatives in Pakistan emphasize the importance of adopting learner-cantered pedagogical approaches and integrating technology into teaching practices, the translation of these policy directives into classroom implementation remains limited. Innovative instructional models, including the flipped classroom approach, have received insufficient systematic investigation within the Pakistani secondary education context.

#### **4. Insufficient Local Empirical Evidence**

While international research indicates promising outcomes associated with flipped classroom implementation in language education contexts, these findings may not automatically transfer to Pakistani educational settings. Significant contextual differences including curricular variations, classroom cultural norms, technological infrastructure constraints, and diverse student learning backgrounds necessitate localized empirical investigation.

Currently, there exists a notable scarcity of quasi-experimental research examining the comparative effectiveness of flipped classroom instruction versus conventional teaching approaches for English achievement at Pakistan's secondary level. This knowledge gap leaves

educators, institutional leaders, and education officials without clear evidence-based direction for pedagogical decision-making.

Consequently, this investigation was undertaken to:

- Evaluate the influence of flipped classroom methodology on English achievement among Pakistani secondary school learners
- Contrast student performance outcomes between flipped and traditional instructional conditions
- Generate empirical evidence capable of informing pedagogical choices in Pakistan's secondary education sector

### **Objectives of the study**

The objectives of the study were to:

1. To find out the effect of Flipped Classroom Instruction on English academic achievement of secondary school students.
2. To compare the achievement level of students learning English using Flipped Classroom Instruction with the students learning English using traditional teaching.
3. To test the efficiency of Flipped Classroom Instruction for high, average and low achievers.
4. To assess the potentiality of Flipped Classroom Instruction as an approach of learner-center pedagogy for the enhancement of English language learning in secondary school in Pakistan.

### **Significance of Study**

The following are some of the stakeholders of this study: It shows the ability of Flipped Classroom Instruction to improve English achievement, learning retention, engagement and active participation for students. For Teachers: It offers evidence for implementing learner-centred and technology-enhanced instructional strategies in the English language classrooms. The results provide suggestions for curriculum developers on how to integrate flipped learning activities into secondary English curriculum. Educational Policymakers: The study offers empirical evidence for policies that support digital learning, technology integration and innovative pedagogical approaches in secondary education. For researchers, it adds to the sparse literature available on FL in Pakistan and can serve as a basis for future experimental and longitudinal studies.

### **Delimitations of the Study**

This study has several limitations. There are some limitations in this study. Several limitations imposed on the study have to be taken into account for the interpretation of the results:

1. The findings from the study could not be generalized because it was carried out in one secondary school.
2. The sample size was relatively small (60 Grade 9 students).
3. The intervention was delivered during a restricted amount of instruction time.
4. The study only included English academic achievement and did not include other factors like attitudes toward learning, motivation and self-regulation.
5. The results may not be representative of all contextual factors that affect student achievement and thus cannot fully explain the results found.

### **Literature Review**

#### **Theoretical foundations of Flipped Learning.**

Theoretical foundations of Flipped learning. The flipped classroom is inspired by some influential education theories which emphasize the acquiring of knowledge and active education model. Of these, constructivist theory offers one of the best bases for the approach (Vygotsky, 1978). Constructivist theories maintain that learning is best when people are given

opportunities to interact with the information; when they relate the new information to prior experience; when they have opportunities to be involved in meaningful social interaction (Piaget, 1970). Learning is thus considered not to be the passive receiving of information but an active building process of understanding. Flipped models embody these principles by moving the initial content delivery out of the classroom and classroom activities to interactive learning (Bergmann & Sams, 2012). Students are involved in discussions, collaborative exercises and problem-solving activities that promote deeper thinking, rather than listening to lectures, thus utilizing valuable in-class time. The other major theoretical underpinning is the Revised Taxonomy for Bloom (Anderson & Krathwohl, 2001). Traditional teaching is usually conducted to memorise and understand the knowledge, and after class the students are asked to perform the higher order thinking skills independently. With the flipping classroom approach, students are provided the opportunity to learn fundamentals outside of class and the application, analysis, evaluation, and creation are done in class (Krathwohl, 2002). Consequently, learners receive more facilitation in learning and have more learning complexities. The Concept of Flipped Classroom in the EFL Classroom Language learning educational problems are special in that students learn in four skills (reading, writing, listening and speaking) learn vocabulary and at the same time learn grammar. In the traditional language classroom, the teacher often takes the lead in providing explanations and activities in the textbook that can limit opportunities for students to interact and communicate in the language (Harmer, 2007). Flipped Classroom is a new classroom organization which is particularly suitable for language teaching. Students can watch grammar explanations, present and teach vocabulary before class to allow them to focus on communicative practice, collaborative learning, and feedback during class (Hung, 2015). These activities offer a good opportunity to engage language that is difficult to engage within the typical instructional model of lecture. The findings on the learning environment for the L2 are encouraging. The studies relating to the flipping of instruction and teaching noticed that the change of the teaching model can improve the learner's learning engagement, learning motivation, participation in class and learning results (Chen Hsieh et al., 2017). Students often find that they enjoy the ability to use instruction outside of class as well as more class time to engage in peer and teacher interaction (Webb & Doman, 2016). Furthermore, systematic reviews have shown that flipped language class can not only enhance students' academic achievement but also enable students to acquire SLL skills, students' confidence and higher order thinking skills (Zainuddin & Halili, 2016). The results prove the significance of the approach in terms of the wider educational goals, not just marks in exams. The focus is on Learner Engagement and Differentiated Learning. Students' involvement is essential to the success of education. Active involvement in instructional activities will result in retention of content, increased understanding and higher academic achievement (Fredricks et al., 2004). Flipped learning has been hailed as having numerous advantages, such as enhancing students' self-confidence in learning (Bond, 2020). The model can be adapted for differentiated instructions as well. Students possess varying backgrounds of knowledge, learning styles and learning rates. This information is delivered at the same time for all students and may be challenging for instructional methods used in a traditional classroom setting (Tomlinson, 2014). However, flipped learning allows students to view learning materials at their own speed (O'Flaherty & Phillips, 2015). Students can go back over materials as many times as necessary for additional support; students can learn materials at a higher rate if they have done more than once. Teachers can give personalized support and feedback more effectively in the classroom (Tucker, 2012). This is one such benefit which can serve to overcome the learning gaps and keep the high achiever happy.

## **Methodology**

## Research Design

The quasi-experimental pretest–posttest equivalent-group design was used to investigate the effect of the flipped classroom teaching model on the achievement of English. This selection of design was made because it enables the comparison of learning outcomes between an intervention group and a comparison group, and differences in academic background prior to the intervention are controlled through pre-testing. The design allowed researchers to determine if students' achievement outcomes were enhanced because of instruction using flipped media over traditional classroom instruction.

## Participants

The subjects for the study were 60 grade 9 students of one secondary school. The participants were randomly assigned to an experimental group or control group depending on their pretest equivalence. The two groups were also similar on academic measures before the intervention, minimizing the possibility that pre-test differences in academic achievement would explain the post-intervention differences.

The experimental group was taught based on the framework of the flipped classroom model, while the control group was taught by means of teacher-centered teaching, which is the traditional method in secondary school English classroom.

## Instructional Intervention

Ten instructional units throughout the intervention. The students of experimental group were given the learning materials prior to their class. Content consisted of recorded explanations, reading materials and guided learning materials to facilitate the introduction of concepts and language skills.

Students were expected to look through these materials on their own prior to class. This allowed for classroom discussion, cooperative work, guided practice, resolution of misunderstandings, and application of concepts learned. Students in the control group received the traditional classroom instruction where content was presented mostly in class with teacher's explanation and then exercised in class and had its homework to do.

## Research Instruments

Achievement was evaluated using three different measures:

### Pretest

A pretest was administered before the intervention to determine baseline equivalence between the experimental and control groups. The assessment was based on the students' prior knowledge and competence in English.

### Posttest

A posttest was given after the completion of the instructional intervention. The posttest was used to assess the effectiveness of the instructional strategies and to see if there were differences between the two.

### Retention Test

A retention test was administered at the end of instruction to measure the amount of knowledge that students retained over time. This measure helped to gain further insights into the sustainability of learning outcomes related to each of the instructional approaches.

## Data Collection Procedure

Prior to the intervention, both groups completed the pretest. After the pre test, the experimental group was given flipped classroom teaching and conventional teaching group was given conventional teaching. At the end of the teaching period, the participants were given the post test and retention test.

Data collected were recorded systematically and ready for statistical analysis.

## Results



### Baseline Group Equivalence

The pre tests scores showed that the experimental and control groups had equal academic levels prior to the intervention. However, no statistically significant difference was found between the two groups, suggesting that students starting the study in both groups had similar levels of English achievement. The mean score for the experimental group was 39.66 (SD = 9.13) while for the control group it was 39.80 (SD = 8.94). The results of statistical analysis did not show significant differences between groups  $t(58) = 0.057$ ,  $p = .955$ . Results of this study support that the two groups were equivalent before the implementation of the instructional intervention.

Posttest Achievement At the end of the teaching period, there were significant differences between the groups. The students who had been taught with “flipped classroom” had significantly higher scores on posttests compared with the students taught in the traditional way. The mean score for the experimental group was 59.86 (SD = 12.83) and for the control group was 48.63 (SD = 11.35). This difference was significant based on the results of statistical analysis,  $t(58) = 3.59$ ,  $p < .001$ . The effect size of .82, calculated, indicates a significant educational effect, thus the observed improvement has not only been statistically significant, but it has also been educationally significant.

**Table 1: Group Equivalence Before Treatment**

| Group              | Sample Size (n)* | Mean (M) | Standard Deviation (SD) |
|--------------------|------------------|----------|-------------------------|
| Experimental Group | 30               | 39.66    | 9.13                    |
| Control Group      | 30               | 39.80    | 8.94                    |

### Independent test

| Test Statistic | Value |
|----------------|-------|
| $t(df = 58)$   | 0.057 |
| p-value        | .955  |
| Cohen's d      | .015  |

The effect size was large, indicating a substantial educational impact of flipped instruction.

Pre-test scores for the experimental and control group did not significantly differ,  $t(58) = 0.057$ ,  $p = .955$ , using the independent-samples t-test. The effect size (Cohen's  $d = .015$ ) was very small, meaning that there was almost no difference between the two groups.

### Achievement by Student Ability Level

#### High-Achieving Students

**Table 2 Posttest Achievement Scores**

**Table 2: Posttest Achievement**

| Group              | Sample Size (n)* | Mean (M) | Standard Deviation (SD) |
|--------------------|------------------|----------|-------------------------|
| Experimental Group | 30               | 59.86    | 12.83                   |
| Control Group      | 30               | 48.63    | 11.35                   |

### Independent Samples t-Test Results

| Test Statistic | Value  |
|----------------|--------|
| $t(df = 58)$   | 3.59   |
| p-value        | < .001 |
| Cohen's $d$    | 0.82   |

Based on  $t(58)$ , the total sample size is 60, assuming equal group sizes (30 participants in each group).

The effect size was large, indicating a substantial educational impact of flipped instruction.

### High-Achieving Students

| Group              | Sample Size (n)* | Mean (M) | Standard Deviation (SD) |
|--------------------|------------------|----------|-------------------------|
| Experimental Group | 10               | 72.50    | 7.21                    |
| Control Group      | 10               | 60.90    | 6.92                    |

### Independent Samples t-Test Results

| Test Statistic | Value |
|----------------|-------|
| $t(df = 18)$   | 3.67  |
| $p$ -value     | .002  |
| Cohen's $d$    | 0.89  |

The independent-samples  $t$ -test revealed that the achievement scores for the post test for the experimental group were significantly higher than the achievement scores of the control group,  $t(58) = 3.59$ ,  $p < .001$ . The experimental group had a much higher mean than the control group. Moreover, the effect size Cohen's  $d$  was 0.82 which showed that the flipped classroom model had a significant educational impact on students' study achievement.

What was most impressive was the level of achievement this student's ability reached. High-Achieving Students The flipped instructors' students had significantly higher scores than the control group students for the top-performing students. The mean score for the experimental group was 72.50 while the control group had a mean score of 60.90. The results of the statistical analysis showed that there was a significant difference between the groups ( $t(18) = 3.67$ ,  $p = .002$ ).

### Average-Achieving Students

On average achieving children, the greatest progress was seen.

**Table 3: Average-Achieving Students**

| Group              | Sample Size (n)* | Mean (M) |
|--------------------|------------------|----------|
| Experimental Group | 10               | 62.40    |
| Control Group      | 10               | 49.20    |

### Independent Samples t-Test Results

| Test Statistic | Value    |
|----------------|----------|
| $t(df = 18)$   | 11.25    |
| $p$ -value     | $< .001$ |
| Cohen's $d$    | 0.95     |

Students in the experimental group had a mean score of 62.40 while students who were taught in conventional way had a mean score of 49.20. This difference was significant,  $t(18) = 11.25$ ,  $p < .001$

### Low-Achieving Students

The students with low achievement scores also showed significant progress after flipped learning. **Low-Achieving Students**

Since the standard deviations were not provided, the table includes the available information only.

| Group              | Sample Size (n)* | Mean (M) |
|--------------------|------------------|----------|
| Experimental Group | 10               | 44.70    |
| Control Group      | 10               | 35.80    |

### Independent Samples t-Test Results

| Test Statistic | Value  |
|----------------|--------|
| $t(df = 18)$   | 4.38   |
| $p$ -value     | < .001 |
| Cohen's $d$    | 0.84   |

The results showed that there was a statistically significant difference between the achievement scores of high-achieving students in the experimental and control groups  $t(18) = 3.67$ ,  $p = .002$ . The effect size (Cohen's  $d = 0.89$ ) was large, which suggests that the improvement of the flipped classroom method was significant for students with high achievement.

The mean score of the experimental group was 44.70 and that of the control group was 35.80. A statistical analysis indicated that there was a significant difference between the groups,  $t(18) = 4.38$ ,  $p < .001$ . In summary, these insights suggest that the advantages of flipping classroom did not only apply to a specific group of students but to all student achievement levels.

### Overall Results

The results of the study suggest that the students' academic performance was significantly improved through the application of the flipped classroom model than with the conventional classroom model. The pre test analysis showed that before the intervention there were no significant differences between the experimental group and the control group, so both groups were at a similar academic level. After the intervention, the experimental group had significantly higher posttest scores, and the effect size was large, indicating that this intervention had significant educational impact. When analyzed by each achievement level, the flipped classroom approach had a positive impact on high, average and low achievers. All three groups experienced statistically significant growth; however, the growth was greatest for the average-achieving group (Cohen's  $d = 0.95$ ), followed by the high-achieving group ( $d = 0.89$ ) and lastly the low-achieving group ( $d = 0.84$ ). From a general perspective, these results indicate that the flipped classroom is a successful instructional strategy that positively impacts the learning of students with different academic levels, and leads to positive gains in overall student achievement.

### Discussion

The aim of this study was to find out if there was such a thing as an improvement in English achievement when secondary school students were taught through the flip classroom approach. The results show clearly the effectiveness of teaching methods based on flipped classroom and conventional classroom teaching in the improvement of students' learning performance. A reason for this is that with flipping students are exposed to the content of the lesson prior to class attendance (Bergmann & Sams, 2012). Outside classroom learning opportunities allow students to revisit the concepts with ease, recap hard-to-learn topics, and be ready for in-class learning. This may be especially useful in language learning environments where students frequently must read new words, phrases, and structures multiple times (Ellis, 2008; Nation, 2006).. A second explanation is related to classroom interaction. Direct instruction was moved out of class time, allowing for discussion to take place, guided practice, collaborative learning, and feedback (Bishop & Verleger, 2013). These activities stimulate more active engagement and further processing of information, activities that are linked to better learning outcomes (Chi & Wylie, 2014; Freeman et al., 2014). The results further indicate that the flipped learning would be beneficial for students with various academic levels.



Improvements were found in both high and average achieving students, and in low achieving students. The pattern suggests that opportunities for differentiated instruction can exist in this approach, as students will be able to interact with learning materials in ways that will suit their individual needs and learning rate. The results are congruent with modern learning theories which place importance on active learning, self-directed learning, and knowledge-building. They also agree with the findings of similar international research which found that FL has a positive impact on students' learning and participation in class (Strayer, 2012; Tomlinson, 2014).

### **Conclusion**

To investigate the effectiveness of Flipped Classroom learning with the aim of enhancing the English learning outcomes of secondary school students, this study employed a quasi-experimental approach. This study used the quasi-experimental approach to examine the effectiveness of Flipped Classroom learning in enhancing the achievement of the English language for students in secondary schools. The results of the study showed that the academic results of the students who were taught by using the flipped learning method were significantly higher than the academic results of the students who were taught by using the traditional learning method. Based on the findings, it is concluded that the "flipped classroom" method is a feasible and effective approach to improve learning outcomes of secondary English education. This will stimulate deeper learning and increased student engagement through independent preparation and active engagement in the classroom.

### **Practical Implications**

The conclusions of this research have a number of implications for education: The secondary schools should examine the use of FL in the English language teaching. 3. Teachers to be trained on digital learning resources development and use. 3. Educational leaders must facilitate learning settings that facilitate and encourage active learning and student engagement. Opportunities for collaborative learning and higher order thinking should be integrated into English language programs by curriculum planners.

### **Limitations**

Several limitations should be considered when interpreting the findings.

1. The study was conducted within a single school setting, which may limit generalizability.
2. The sample size was relatively small.
3. The intervention period was limited to ten instructional units.
4. External variables influencing student performance could not be completely controlled.

### **Recommendations for Future Research**

Based on the findings, limitations, and delimitations of the present study, the following recommendations are proposed for future research endeavours. These recommendations are organized according to thematic areas to provide clear guidance for subsequent investigations in the field of flipped classroom instruction and English language education in Pakistan.

First, regarding the scope and generalizability of future studies, it is recommended that researchers employ larger sample sizes drawn from multiple secondary schools across different districts and provinces of Pakistan to enhance the external validity and generalizability of findings to broader populations. Additionally, researchers are encouraged to conduct comparative investigations across varied educational settings, including public and private institutions, urban and rural locations, and schools with differing levels of technological infrastructure, to determine contextual influences on flipped classroom effectiveness.

Second, concerning the duration of interventions and retention of learning outcomes, future research should implement flipped classroom interventions over complete academic years or

multiple semesters to evaluate whether initial learning gains are sustained over extended periods and whether additional benefits emerge with prolonged exposure to the approach. Scholars are advised to conduct longitudinal investigations that track student English language development across several academic years to determine the lasting effects of flipped instruction on long-term academic performance and evolving language proficiency. It is further recommended that subsequent studies measure knowledge retention at prolonged intervals, such as three months, six months, and one year post-intervention, to better understand the durability of learning outcomes produced through flipped pedagogical approaches.

Third, with respect to the inclusion of additional variables in future investigations, researchers should examine the impact of flipped classroom instruction on educationally significant affective variables, including learner motivation, engagement, self-regulation, attitudes toward English, language anxiety, communicative self-efficacy, and autonomous learning behaviors. Furthermore, scholars are encouraged to investigate how individual difference factors, such as prior academic achievement, learning style preferences, digital literacy levels, socioeconomic background, gender, and first language, moderate the effectiveness of flipped instruction.

Fourth, regarding methodological approaches, it is recommended that future studies employ mixed-methods research designs combining quantitative outcome measures with qualitative data derived from interviews, focus group discussions, and systematic classroom observations to gain richer insights into participant experiences with flipped learning. Scholars should systematically examine practical obstacles and facilitating factors associated with flipped classroom implementation in Pakistani secondary contexts, including teacher preparedness, student readiness, technological constraints, and institutional support structures. Additionally, future research should investigate student and teacher perceptions of flipped learning, examining preferences, satisfaction levels, and perceived advantages and disadvantages of this instructional approach from diverse stakeholder viewpoints.

Fifth, concerning comparative investigations across models and domains, researchers are advised to contrast the effectiveness of alternative flipped classroom configurations, including complete versus partial flipped implementations, video-based versus text-based pre-class materials, and individual versus collaborative pre-class preparation activities. It is recommended that future studies examine flipped instruction effectiveness across diverse academic disciplines, including sciences, mathematics, social studies, and additional languages, to determine subject-specific variations in effectiveness. Scholars should also investigate flipped learning effectiveness across multiple educational stages, from primary through tertiary education, to identify developmental and contextual factors influencing outcomes. Moreover, future research should examine flipped classroom effects on distinct English language skill domains, including reading comprehension, written expression, listening comprehension, oral communication, vocabulary acquisition, and grammatical knowledge.

Sixth, in relation to technology and resource considerations, it is recommended that research identify minimum technological infrastructure, instructional resources, and teacher preparation requirements necessary for successful flipped classroom implementation within resource-limited Pakistani educational settings. Scholars are encouraged to explore practical alternatives for implementing flipped learning in schools with constrained digital access, including printed preparatory materials, audio-based instruction, offline video distribution through USB drives, and school-based technology centers. Additionally, future studies should compare the costs associated with flipped versus traditional instruction and assess whether learning gains justify investments in technology, materials, and professional development.

Seventh, concerning methodological rigor enhancement, it is recommended that future research employ true experimental designs featuring random assignment of students, teachers, or

institutions to conditions to establish stronger causal evidence for flipped classroom effectiveness. Researchers should incorporate more robust controls for potential confounding variables, including teacher effects, classroom environmental factors, and other extraneous influences through advanced analytic approaches such as multi-level modeling or hierarchical linear modeling. Scholars are also advised to conduct systematic replication investigations to verify the findings of the present research while progressively building a robust, cumulative evidence base concerning flipped classroom effectiveness.

Eighth, with respect to contextual and systemic factors, future research should evaluate whether flipped instruction aligns with Pakistani classroom culture and student expectations, identifying cultural adaptations necessary for successful implementation. It is recommended that studies investigate the role of parental support and community resources in facilitating student success with flipped learning approaches. Scholars should apply established technology acceptance models to understand factors influencing teachers' adoption of flipped approaches and identify strategies to increase sustained use of flipped instruction. Additionally, future research should examine how collaborative in-class activities influence learning outcomes and investigate peer interaction patterns and their relationship to achievement gains in flipped classrooms.

Ninth, concerning professional development and teacher training, it is recommended that research design and evaluate professional development interventions preparing educators for effective flipped classroom implementation, addressing both technological competencies and pedagogical content knowledge. Scholars should also investigate teacher characteristics, beliefs, and attitudes that predict successful flipped classroom implementation and student learning outcomes.

In conclusion, the recommendations outlined above provide a comprehensive agenda for future research on flipped classroom instruction in Pakistani secondary education. Priority should be given to studies that address the limitations of the present investigation, particularly those related to sample size, contextual diversity, intervention duration, and inclusion of additional outcome variables. Collaborative efforts among researchers, educators, and policymakers are essential to translate these research recommendations into improved educational practices and enhanced student learning outcomes in Pakistan.

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