Perceptions of Teachers and Students Regarding the 10th Grade Students' Homework in Perspectives:Academic Achievement and Practices

ABSTRACT

Homework is here to stay, but perspectives about its influence on student achievement vary among stakeholders,as do the ways of using it. This study used a secondary data analysis approach to investigate the correlation between homework and student achievement, examining students' and teachers' perspectives and practices. The secondary datasets were sourced from a doctoral study that used cross-sectional survey questionnaires and a mathematics test (students only) administered to 1500 Grade 10 students and 60 teachers teaching Grade 10 students across 60 schools with Grade 10 students. Findings indicated that students with homework assigned three to four times weekly tend to achieve higher mathematics test scores. Furthermore, teachers who consistently employhomework for various purposes, such as monitoring completion, providing feedback, and engaging students in class discussions, are associated with higher test scores. Despite many students participating in out-of-school mathematics lessons, only some invested extended time in in-school mathematics-related activities, indicating a potential gap in learning opportunities.

Keywords: Mathematics, Teachers, Students, Homework, Academic Achievement and Practices.

1. INTRODUCTION

The association between homework and student accomplishment has aroused considerable interest among scholars in education (Good & Lavigne, 2017; Fan et al., 2017; Murphy et al., 2020; Rosaro et al., 2018). Homework, as commonly construed, refers to assignments given to students by educators outside of regular school hours (Cooper et al., 2006). Under this definition, activities such as in-school guided study, home study courses, and extracurricular pursuits are not classified as homework.

Numerous studies have indicated a positive correlation between homework and student success (Brock et al., 2007; Cooper et al., 2006; Muhlenbruck et al., 2000). This correlation tends to be robust at the secondary school level, moderate at the lower secondary school level, and weaker at the elementary school level, prompting a deeper exploration of homework's effectiveness and drawbacks.

Homework exhibits both advantages and disadvantages. The beneficial aspects of homework encompass immediate academic gains, long-term scholastic advantages, non-academic benefits, and benefits for familial involvement (Brock et al., 2007; Cooper et al., 2006). For instance, in immediate academic benefits, homework correlates positively with enhanced retention of factual knowledge, heightened comprehension, improved critical thinking, and enriched curriculum experiences (Brock et al., 2007; Cooper et al., 2006; Rosario et al., 2018). Regarding long-term academic benefits, homework is associated with increased learning during leisure time, a positive school attitude, and enhanced study habits and skills (Brock et al., 2007; Cooper et al., 2006; Cooper et al., 2012). Additionally, non-academic benefits include greater self-directedness, improved self-discipline, enhanced time management, heightened curiosity, and independent problem-solving (Brock et al., 2007; Cooper et al., 2006; Xu, 2024). In terms of familial benefits, homework is linked to heightened parental appreciation and involvement in education, increased parental interest in a child's academic progress, and heightened student awareness of the home-school connection (Cooper, 2012; Grijalva-Quinonez, 2020; Shi & Wang, 2024).

Conversely, the adverse effects of homework are categorized into various groups, including the satiation effect, parental intervention, and academic dishonesty (Cooper et al., 2006). The satiation effect involves

a waning interest in academic material and experiences of physical and emotional fatigue (Moe et al., 2020). Parental intervention pressures students to complete homework assignments, potentially needing clarification due to different instructional approaches compared to the classroom setting (Nunez et al., 2017). Academic dishonesty related to homework includes copying from peers and seeking unauthorized assistance (Desiron & Petko, 2023). Furthermore, drawbacks of homework encompass a deprivation of leisure time, limited access to community activities, and heightened disparities between high and low achievers (Cooper et al., 2006). Homework has also been implicated in exacerbating social inequalities, such as language barriers at home and disparities in access to supplementary resources, particularly for children from low socioeconomic backgrounds (Brock et al., 2007; Cooper, 1989).

The effectiveness of homework hinges on various factors. Optimal homework duration varies, with suggested ranges of 1 to 10 hours per week for secondary school students and 5 hours per week for elementary school students (Cooper & Valentine, 2001). Warton (2008) underscored the need to delve deeper into students' perceptions and attitudes toward homework, emphasizing factors such as parental and teacher perspectives, the significance of homework, and developmental disparities in understanding homework. Moreover, research by Mullis et al. (2008) highlighted the significance of homework frequency and duration, with students assigned moderate amounts of homework more frequently showing better performance.

Similarly, the Organization for Economic Co-operation and Development (OECD) has reported a positive correlation between homework time and student achievement (2022). However, measuring this relationship is challenging due to varying student learning paces, with slower learners often spending more time on homework yet yielding poorer outcomes (OECD, 2022). Additionally, homework facilitates peer learning (Epstein & Voorhis, 2001).

Educators utilize homework to optimize student learning outcomes (Davidovitch & Yavich, 2017; Mullis et al., 2008; Rosario et al., 2019; Tas et al., 2014). Teachers employ homework to monitor student progress, provide feedback, reinforce classroom discussions, and assign grades or marks (Mullis et al., 2008). They hold optimistic views regarding homework's impact on student learning, with teachers who prioritize homework more inclined to engage with parents regarding homework completion (Tas et al., 2014).

Lastly, parents play a pivotal role in their children's homework (Bowen & Lee, 2006; Doctoroff & Arnold, 2017; Driessen & Sleegers, 2005; Dumont et al., 2014; Grijalva-Quiñonez; 2020; Hoover-Depmsey & Sandler, 1995; 1997). Hoover-Dempsey et al. (2001) emphasized the multifaceted role of parents in homework, encompassing the establishment of a conducive learning environment, role modeling, reinforcement, instruction, and the cultivation of self-regulated learning skills. Doctoroff and Arnold (2017) stressed the importance of children's homework engagement, highlighting parents' pivotal role in fostering such engagement and academic success. Grijalva-Quiñonez (2020) reported a mutually reinforcing relationship between parental involvement in homework and children's academic performance.

Given the multitude of benefits and proponents of homework in improving student outcomes, and considering its effectiveness is contingent upon various factors, this study explores teachers' and students' perceptions of 10th-grade students' homework practices, aiming to understand the complex dynamics of academic achievement. By examining the viewpoints of educators and learners, we strive to uncover insights into the broader landscape of homework engagement and its influence on academic performance. Through a comprehensive approach encompassing key stakeholders' perspectives, this study seeks to illuminate the various aspects of homework assignments and their implications for student learning outcomes. Specifically, this seeks to address critical inquiries concerning homework and student achievement:

1. What constitutes an optimal homework frequency?
2. How much time should be allocated to homework?
3. What alternative learning activities do students engage in apart from homework?
4. How do educators handle homework assignments?

2. METHOD

This study used a secondary data analysis, a research approach gaining traction with the advances in digital archival (Boslaugh&Boslaugh, 2007; Dunn, 2015; Johnston, 2014). The secondary data was from doctoral research (Tshering, 2012). The doctoral research involved 1500 Grade 10 students and 60 teachers who taught the 1500 students in 60 schools(see Tshering, 2012 for more information about the sample participants).Furthermore, the doctoral study used cross-sectional survey questionnaires, one for students and one for teachers. The doctoral research also used a math test. Therefore, three secondary datasets were used: student dataset on homework, teacher dataset on homework, and math test data. A brief description of the secondary data is presented next.

The student dataset on homework consisted of 22 items, including homework frequency (five items), homework time (five items), study time (six items), and out-of-school time lessons (six items). The teacher dataset had 13 items, including homework frequency (three items), homework time (five items), homework types (three items,) and homework use (five items). The math test had 42 items from the Bhutanese Grade 10 math curriculum(see Tshering, 2012 for complete information about the items).

Utilizing secondary data introduces several delimitations to this study, however. Firstly, the constraints imposed by the pre-existing dataset's variables and definitions may only partially align with the researcher's preferences. Additionally, the need for more control over the original data collection process may introduce biases, errors, or omissions inherent in the dataset. The temporal and spatial limitations of the secondary data may restrict the generalizability of findings to specific timeframes, geographic regions, or demographic groups. Furthermore, the retrospective nature of secondary data analysis hinders access to contextual information and prevents follow-up inquiries to clarify ambiguities. Finally, the inability to explore causal relationships or address specific research questions requiring longitudinal or experimental designs constrains the study's scope. Acknowledging these delimitations, approaching the interpretation of findings cautiously, and recognizing the inherent constraints in the secondary data analysis process are essential.

3. Results and DISCUSSION

2.1.1 What constitutes an optimal homework frequency?

Student feedback on the frequency of mathematics homework assigned by their teachers and the time devoted to homework were utilized as indicators of homework frequency and time allocation. Table 1 illustrates the distribution of students based on the frequency of mathematics homework assignments.

Table 1
Percentage of Students by Homework Frequency and Mathematics Test Scores

Frequency	%	SE	Math Scores	
			Mean	SE
Every day	50.78	3.96	360.87	5.60
3 or 4 times a week	36.67	3.00	361.59	5.08
1 or 2 times a week	10.31	1.76	355.21	9.66
Less than once a week	1.84	0.57	363.88	10.83
Never	0.35	0.18	375.66	26.14

Note: This table has been reprinted with permission.

Table 1 reveals that less than 3% of students reported being assigned mathematics homework less than once a week. However, this subgroup's performance scores were deemed unreliable due to high standard errors. Conversely, nearly four-fifths of students indicated receiving mathematics homework three or four times a week, with these students exhibiting relatively higher mathematics performance scores. In summary, this table suggests a correlation between more frequent homework completion and higher mathematics test scores, with students who reported doing homework every day or 3-4 times a

week generally scoring higher on average. However, it is essential to note that correlation does not imply causation, and other factors could influence these results.

Teachers also provided insights into the duration of mathematics homework assignments given to students. Table 2 demonstrates that most students (76.7%) were instructed by teachers who assigned homework for nearly every lesson.As depicted in Table 2, students' performance tended to improve when teachers assigned homework requiring 31-60 minutes per lesson.

Table 2

Percentage of Students Whose Teachers Report Assigning Homework by Students' Mean Mathematics Test Scores

Frequency	%	SE	Mathematics Test Scores	
			Mean	SE
Every or almost every lesson	76.7	6.10	365.43	4.64
About half of the lesson	19.5	5.76	344.01	7.18
Some lessons	3.7*	2.63	349.21	13.97

* The number of student respondents was less than 50. Note: This table has been reprinted with permission.

The data presented in Table 2 indicates a clear relationship between homework completion frequency and students' mathematics test scores. Notably, those who reported completing homework every or almost every lesson achieved the highest mean test score, with a relatively low standard error. Conversely, students who completed homework only sometimes had the lowest mean score, accompanied by a significantly higher standard error. This suggests that consistent homework completion is associated with higher academic achievement in mathematics. Furthermore, the distribution of homework completion frequency reveals that most students tend to complete homework regularly, which aligns with their higher test scores. However, while these findings suggest a positive correlation between homework completion frequency and test performance, it is essential to consider other factors that may influence academic achievement, such as individual study habits and teacher effectiveness. Overall, this analysis underscores the importance of consistent homework completion as a potential contributor to academic success in mathematics, though further research is needed to establish causality definitively.

2.1.2 How much time should be allocated to homework?

While the frequency of homework assignments is essential, students' time on homework is another crucial factor to consider. Table 3 presents data on the distribution of students and teachers based on the duration of time spent on homework.

Table 3

Percentage of Students by Homework Time and Mean Mathematics Test Scores

Time	Student Report				Teacher Report			
	%	SE	Math Score		%	SE	Math Score	
			Mean	SE			Mean	SE
Fewer than 15 minutes	7.66	0.96	352.13	9.21	13.8*	5.04	386.65	16.63
15-30 minutes	31.56	3.84	362.86	5.93	49.3	7.12	354.89	5.36
31-60 minutes	30.82	2.38	366.7	5.13	32.5	6.59	358.40	5.14
61-90 minutes	11.57	1.61	361.20	7.89	3.9*	2.71	351.13	10.72
More than 90 minutes	18.35	2.33	350.92	6.22	0.5*	0.09	422.11	7.71

* The number of student respondents was less than 50. This table has been reprinted with permission.

Table 3 offers an intricate examination of the correlation between time allocated to homework and mean mathematics test scores, as reported by both students and teachers. Notably, as the duration of homework increased from fewer than 15 minutes to 31-60 minutes, there was a corresponding rise in

mean test scores, according to student and teacher reports. However, discrepancies between student and teacher perceptions were evident, particularly in extreme time categories, where student-reported mean scores tended to be lower than those reported by teachers. For instance, students who spent more than 90 minutes on homework reported a mean mathematics test score of 350.92, whereas teachers indicated a substantially higher mean score of 422.11 for this group. Nonetheless, it is crucial to acknowledge the caveat of smaller sample sizes for specific time categories, as denoted by asterisks. This nuanced analysis underscores the complex interplay between homework time allocation and academic performance in mathematics, emphasizing the importance of considering multiple perspectives and sample sizes when interpreting such data.

Combined data from Tables 2 and 3 suggest that the most effective homework frequency maybe three to four times a week, with an optimal time allocation of 15 to 60 minutes for completing each homework assignment.

2.1.3 What alternative learning activities do students engage in apart from homework?

Students were surveyed regarding the amount of time spent weekly on various mathematics-related activities. Table 4 displays the percentage of students engaging in multiple mathematics learning activities for over two hours per week.

Table 4

Percentage of Students Spending more than Two Hours on Activities Related to Learning Mathematics

Activities	%	SE
Homework or other study set by your mathematics teacher	63.9	2.41
Remedial classes in mathematics at school	21.9	1.39
Enrichment classes in mathematics at school	17.1	1.27
Work with a mathematics tutor	21.8	1.22
Attending out-of-school mathematics classes	15.8	0.78
Other mathematics activities (e.g., mathematics competitions, mathematics club)	11.2	1.07

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Table 4 illustrates the percentage of students who dedicate more than two hours to various activities to enhance their mathematical skills. It reveals that most students, approximately 63.9%, spend significant time on homework or other study materials assigned by their mathematics teachers. Furthermore, a considerable fraction of students, ranging from 11.2% to 21.9%, invest substantial time in remedial classes, enrichment classes, tutoring sessions, attending out-of-school classes, and engaging in other mathematics-related activities like competitions or clubs. These findings underscore a widespread commitment among students to improving their mathematical proficiency through diverse educational avenues. Despite variations in the intensity of engagement across different activities, the data highlights a collective dedication to enhancing mathematical skills beyond regular classroom instruction.

However, the percentages of students attending different out-of-school-time lessons were notably higher, as depicted in Table 5.

Table 5

Percentage of Students Attending the following Out-of-School-Time Lessons

Activities	%	SE
One to one lessons with a teacher who is also a teacher at your school	54.4	2.07
One to one lessons with a teacher who is not a teacher at your school	25.9	1.69
Lessons in small groups (less than 8 students) with a teacher who is	49.0	2.42

also a teacher at your school		
Lessons in small groups (less than 8 students) with a teacher who is not a teacher at your school	19.1	1.35
Lessons in larger groups (8 students or more) with a teacher who is also a teacher at your school	52.4	2.60
Lessons in larger groups (8 students or more) with a teacher who is not a teacher at your school	16.2	1.18

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Table 5 offers insights into the participation rates of students in various types of out-of-school-time lessons, categorized by the teacher's affiliation and group size. Notably, the most prevalent form of instruction is one-to-one lessons with teachers who are also educators at the student's school, with 54.4% of students engaging in such sessions. Additionally, lessons conducted in small groups, particularly with teachers from the student's school, are also popular, with 49.0% attending these sessions. Conversely, participation in lessons held in larger groups, especially with teachers not affiliated with the students' school, is notably lower, with only 16.2% of students attending such classes. These trends suggest a clear preference among students for personalized instruction and smaller group settings, mainly when taught by familiar educators. Overall, the table underscores the diversity in out-of-school-time lesson formats and teacher arrangements, emphasizing the importance of tailored educational experiences to supplement traditional classroom learning.

2.1.4 How do educators handle homework assignments?

Teachers were surveyed regarding the frequency with which they assigned various types of homework to their students. Table 6 illustrates that over three-quarters of students were instructed by teachers who assigned problem/question sets as homework almost daily. Conversely, less than 1% of students were taught by teachers who reported assigning homework on gathering data and reporting almost daily.

Table 6

Percentage of Students whose Teachers Report Assigning and Using Homework Almost Always or Sometimes

Measures	Always or almost always		Sometimes	
	%	SE	%	SE
Homework Assignment				
Doing problem/question sets	75.2	6.42	24.8	6.42
Gathering data and reporting	0.9	0.13	78.8	5.78
Finding one or more applications of the content covered	23.5	6.22	62.4	6.98
Use of Homework				
Monitor whether or not the homework was completed	76.9	6.49	23.1	6.49
Correct assignments and then give feedback to students	50.8	7.12	49.2	7.12
Have students correct their own homework in class	12.3	4.67	70.7	6.33
Use the homework as the basis for class discussion	27.2	6.13	72.8	6.13
Use the homework to contribute towards students' grades or marks	53.5	7.06	44.4	7.00

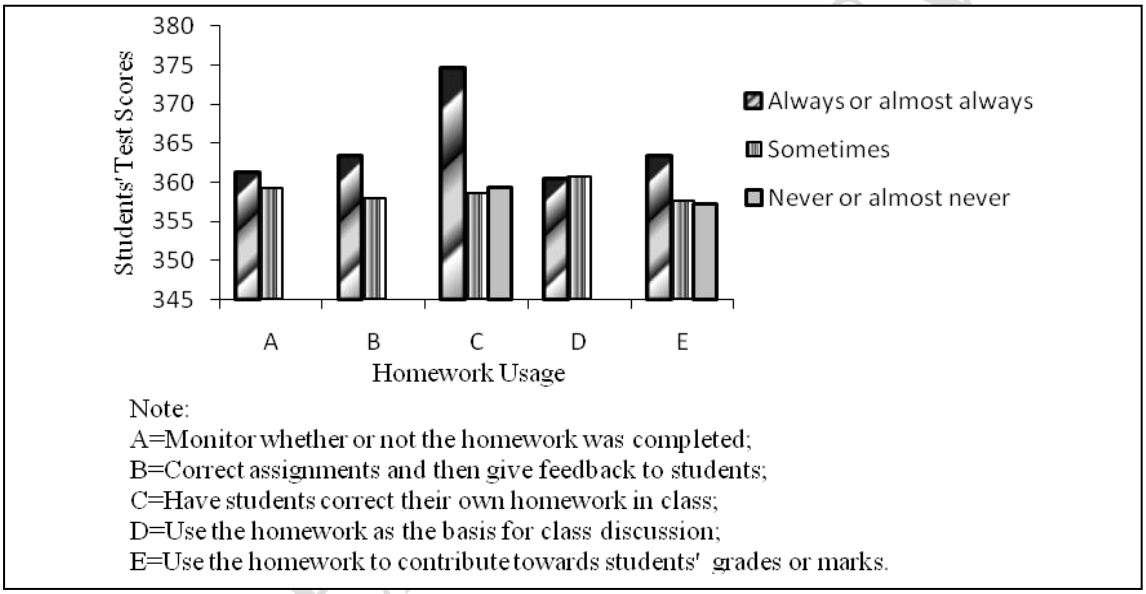
Note: This table has been reprinted with permission.

Table 6 offers an in-depth analysis of the frequency with which teachers assign and utilize homework in their teaching practices, as reported by students. Notably, the data illustrates variations in the assignment and usage patterns across different measures. Assigning problems or question sets is expected, with 75.2% of teachers indicating they do so almost always or sometimes. In contrast, other assignments are less frequent, such as gathering data and reporting or finding applications of covered content. Regarding homework use, monitoring completion and correcting assignments with feedback are standard practices among teachers, each reported by approximately half of the respondents.

Additionally, using homework to improve students' grades or marks isprevalent. However, there are also notable differences in the frequency of specific homework usage strategies, such as having students correct their homework in class or using homework as the basis for class discussions, which are reported less frequently. Table 6 underscores teachers' diverse approaches in assigning and utilizing homework, shedding light on classroom instructional strategies.

How does the teachers' use of homework relate to students' performance on the mathematics test? Figure 1suggests a correlation between how teachers utilize homework assignments and students' performance on Mathematics tests. Furthermore, among the various ways teachers incorporate homework, having students correct their assignments in class is particularly beneficial. This indicates that students' active involvement in reviewing and correcting their homework during class may lead to better comprehension and retention of mathematical concepts, ultimately resulting in improved test performance.

Figure. 1
Students' Test Scores and Teachers' Usage of Students' Homework



Note: This figure has been reprinted with permission.

The findings presented in this secondary data analysis study underscore the significance of homework in influencing student performance, particularly in mathematics education. Consistent with existing literature, the study confirms homework as a correlate of student performance, aligning with previous research by Brock et al. (2007), Cooper (1989), and Cooper et al. (2006). Notably, the analysis of Grade 10 Bhutanese students reveals a peak in performance associated with homework assignments ranging from 15 to 60 minutes, administered three to four times per week. These findings resonate with PISA research conducted by OECD (2022), highlighting the global relevance of optimal homework practices in enhancing learning outcomes.

Examination of homework frequency, duration, and teacher involvement contributes valuable insights into effective instructional practices and their impact on academic achievement. This study emphasizes the importance of aligning homework policies with optimal frequency and duration to maximize effectiveness. By elucidating specific frequencies and times at which homework contributes most significantly to student learning, educators are encouraged to develop tailored homework policies conducive to academic success (Mullis et al., 2008). Examination of teachers' practices regarding homework assignments and

utilization provides further insights into instructional strategies. Most students receive regular homework assignments, primarily requiring 15 to 30 minutes.

Additionally, problem-solving tasks emerge as the most frequently assigned homework type, underscoring its prevalence in mathematics education (Epstein & van Voorhis, 2001; Fan et al., 2017; Good & Lavigne, 2017). Furthermore, this study showed a positive association between teachers who consistently utilize homework in various ways and higher student achievement. Particularly noteworthy is the significant impact of specific homework utilization methods, such as having students correct their assignments in class, on enhancing learning outcomes (Rosario et al., 2019; Tas&Oztekin, 2014).

Overall, the findings highlight the multifaceted role of homework in facilitating student learning and academic achievement. By recognizing the nuanced relationship between homework practices and student performance, educators can implement evidence-based instructional strategies that promote positive learning outcomes in mathematics education and beyond (Rosario et al., 2014). This underscores the importance of ongoing research and collaboration in refining homework practices to effectively meet students' diverse needs (Fan et al., 2017).

Some recommendations from this study are possible. Schools may develop homework policies based on purpose, frequency, types, feedback, and parental role. The policies may be supported with operational guidance.

Even with its practical findings, this study has limitations. Despite its several advantages, a secondary data analysis study has disadvantages (Boslaugh&Boslaugh, 2007; Dunn, 2015; Johnston, 2014).In line with some disadvantages, the nature of the source data controls this study's depth, other than interpreting its findings by drawing the current literature. Likewise, the geographical coverage of the source data, including demographic variables, may not be as representative as it was because of changes in socioeconomic structures and other resources. These limitations warrant caution when comprehending the findings of this study. Finally, the source data were collected using survey questionnaires that might have deprived the scope of the source data of the context necessary to fully understand incredibly complex topics like homework merely fromrespondents' answers. Future research may consider these limitations.

4. CONCLUSION

This study contributed valuable insights into the complex relationship between homework practices and student achievement, particularly in mathematics education. The findings underscored the significance of homework as a correlate of academic performance, aligning with previous research and highlighting its potential to enhance learning outcomes when implemented effectively.

Consistent with existing literature, the analysis revealed a peak in student performance associated with homework assignments of optimal frequency and duration, ranging from 15 to 60 minutes, administered three to four times per week. These findings emphasized the importance of developing homework policies aligned with research-based practices to maximize their effectiveness in promoting student learning.

Moreover, the study shed light on the role of teachers in homework assignment and utilization, emphasizing the prevalence of problem-solving tasks and the impact of various homework utilization methods on student achievement. The findings underscored the importance of teacher involvement and instructional strategies in facilitating positive learning outcomes through homework.

In sum, this study highlighted the multifaceted nature of homework and its potential to contribute to students' academic success. By recognizing the nuanced relationship between homework practices and student performance, educators can make informed decisions about designing homework policies and implementing evidence-based instructional strategies to meet student's diverse needs effectively.

Moving forward, further research is warranted to explore additional factors influencing the effectiveness of homework, such as student perceptions and attitudes towards homework, parental involvement, and the

role of socio-economic factors. By refining our understanding of homework practices and their impact on student learning, educators can strive towards creating optimal learning environments that foster academic excellence and equitable educational opportunities for all students.

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