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What Is the Effect of Independent Learning/Homework in Achieving a School-wide Academic Excellence?

Introduction

Homework is a form of independent learning which happens outside normal school hours. It provides an opportunity for students to revise what they have been taught as well as the chance to extend their learning.

Research shows that the overall benefits of engagement with homework far outweigh its supposed disadvantages (Cooper, et al., 2006). However, if students do not complete the homework set, these said benefits may not accrue to them.

Currently, at school X, the average rate of (compulsory) maths homework completion is less than 50%. The numbers used to be a lot higher when there was the risk of being put in after-school detention for non-compliance. This meant that many of the students were not intrinsically motivated to engage in homework, they only did to escape being in detention. Students could not immediately see the benefit of engaging in homework and there was no data to show any correlation between engaging in homework and improved performance for individual student. Hence, the lack to motivation to engage.

The non-completion of homework meant that majority of the students were not engaging in any independent learning and therefore lack the competence and confidence required for challenge and problem solving in mathematics.

This research aims to improve homework engagement, which should result in better academic outcomes for students, especially evident in end of unit tests results and ultimately exam results.

Literature_Review

In England, the relationship between homework and academic attainment has been a topic of controversy since the mid-19th century (Gordon, 1980 cited in (Foyle & Bailey, 1985). The controversies about the impact of homework on academic achievement and research studies have even questioned if the benefit gained by students engaging in homework is 'worth the trouble' (Eren & Henderson, 2011). However, studies have shown a positive correlation between engagement with homework and improved academic outcomes (Valle, et al., 2016). Cooper, Robinson and Patall (2006) concluded that there is a high chance that homework will have a significant impact on a student's academic path (Cooper, et al., 2006). Some studies also show non-academic benefits of engaging with homework, such as resilience, self-discipline, self-direction, time management and problem-solving skills (Cooper, et al., 2006; Ramdass & Zimmerman, 2011).

Homework can be defined as the task given by teachers to their students to be completed outside normal school hours (Cooper, 1989). However, this definition was extended depending on the

purpose, the degree of choice, the skills required, and the degree of individual or team effort (Bas, et al., 2017; Cooper, et al., 2006).

Since the beginning of the 20th century, the public views about homework have continued to swing left-right-left like a pendulum. In his work, Cooper (1989) noted that research has been used to justify whatever the position of interest was at that time (Cooper, 1989). This was because of what he called "selective attention and imprecise weighing of evidence" (Cooper, 1989).

Therefore, to effectively analyse the effect of homework on academic performance, researchers must consider the various factors contributing to these effects; these effects and the factors impacting them are summarised in figures 1 and 2 below (Cooper, 1989; Cooper, et al., 2006). In their synthesis, they identified that it is more beneficial for homework research to choose a focus such as a subject area (e.g. maths), individual community or school context, year group etc. (Cooper, et al., 2006). They were modest in their conclusion of the causality effect of homework on academic achievement. Therefore, it is better to consider the association between homework and achievement rather than causality (Cooper, et al., 2006).

Positive Effects
Immediate achievement and learning
Better retention of factual knowledge
Increased understanding
Better critical thinking, concept formation, information processing
Curriculum enrichment
Long-term academic effects
Willingness to learn during leisure time
Improved attitude toward school
Better study habits and skills
Nonacademic effects
Greater self-direction
Greater self-discipline
Better time organization
More inquisitiveness
More independent problem solving
Greater parental appreciation of and involvement in schooling
Negative Effects
Satiation
Loss of interest in academic material
Physical and emotional fatigue
Denial of access to leisure-time and community activities
Parental interference
Pressure to complete assignments and perform well
Confusion of instructional techniques
Cheating
Copying from other students
Help beyond tutoring
Increased differences between high and low achievers

Figure 1: Suggested Effects of Homework (Cooper, 1989)

Exogenous Factors	Assignment Characteristics	Initial Classroom Factors	Home-Community Factors	Classroom Follow-up	Outcomes or Effects
Student characteristics Ability Motivation Study habits Subject matter Grade level	Amount Purpose Skill area utilized Degree of individualization Degree of student choice Completion deadlines Social context	Provision of materials Facilitators Suggested approaches Links to curriculum Other rationales	Competitors for student time Home environment Space Light Quiet Materials Others' involvement Parents Siblings Other students	Feedback Written comments Grading Incentives Testing of related content Use in class discussion	Assignment completion Assignment performance Positive effects Immediate academic Long-term academic Nonacademic Parental Negative effects Satiation Denial of leisure time Parental interference Cheating Increased student differences

Figure 2: A Model of Factors Influencing the Effect of Homework (Cooper, 1989)

The "maybe" answer to the question "does homework lead to academic achievement?" (Thomas, 1992) was because:

> homework probably involves the complex interactions of more influences than any other instructional device – Harris Cooper

In the context of this research, homework is regarded as a practice assignment to help students consolidate skills already taught in class in the classroom. This is one of the classifications in the taxonomy of homework devised by Lee and Pruitt, cited in (Thomas, 1992). Thomas (1992) also summarised Foyle and Bailey's points on what the future focus should be for research in homework as follows (Thomas, 1992):

1. Researchers should focus on the relationship between homework and academic achievement. This is in line with the conclusion of Cooper and his research group (Cooper, 1989; Cooper, et al., 2006).
2. Experiments should be well designed. This is because of the poor design of experiments in this field of research (Cooper, 1989). Cooper (1989) noted that homework studies will be more valuable if they are conducted on a large scale.
3. The researcher needs to devise a homework approach that leads to academic improvement.

Research shows that the advantages of engagement with homework surpass its supposed disadvantages (Cooper, et al., 2006). However, for homework to be beneficial, studies (Foyle & Bailey, 1985; Cooper, 1989; Thomas, 1992) suggest that the right amount of homework must be set for the right group of students based on their ability.

Therefore, this research project will investigate the effect of maths homework engagement on the academic performance of students in school X and as suggested by Foyle and Bailey (1989), develop an intervention to improve homework engagement. Focussing on one subject means that some of the factors influencing homework can be controlled, thereby limiting the complex interactions in the quote accredited to Harris Cooper (Thomas, 1992).

Methodology

The focus of this research will be one of my year 9 classes (29 students).

Stage 1: An in-school intervention (using a maths homework platform to engage in independent learning) was provided for 30 min every week (during lessons) for the 4 weeks up till the week commencing 12th December 2022.

During this period, homework completion data was monitored weekly to compare with the completion rate prior to the intervention.

Stage 2: Another set of interventions began on the week commencing 9th January for 4 weeks. During this period, the examination preparedness of the students was investigated through in-class tests; homework data was also monitored to see if the completion rate improved.

The study made use of data available on the maths homework platform. This included homework completion data, the time spent completing homework, questions students struggle to complete, the number of attempts on each question.

Mid-year exam data from the previous and current academic years was also compared for the students in the study.

The hope was that data analysis of the result would show that engaging in independent learning/homework will improve the academic performance of students in school X. The success experienced by the students after **Stage 2** should be a form of intrinsic motivation that will result in improved homework engagement.

Equipment needed:

29 laptops were used for each intervention. These were already available in the maths department.

Stakeholders:

- 29 year 9 students – all the students were informed about the study and the benefits of the program was also be shared so that students can take the intervention seriously.
- The head of the maths department, who approved the intervention would be interested in seeing a positive homework statistic.
- The assistant head of the maths department who had some of the data required for the study.
- One of the maths teachers who taught one of my year 8 classes once a week.
- Other maths teachers.
- IT department.
- SLT members would want to see the potentials of this intervention becoming a whole school approach as a proactive measure for improved GCSE math result.

Risks

Internet failure in school or at home; login problems. Students were asked to share any of such challenges and help was sought from IT department.

Student absence during the period of intervention was a concern because of its potential affect the result. However, over 98% of the students in this study had over 97% attendance rate.

Ethics

- All students were my current students.
- I had unlimited access to all the data to be used for this study.

- Consent was not required for this study as the data were anonymized.
- Students would benefit academically (improved scores) and non-academically (resilience, self-regulation, self-direction, time management, confidence etc.). These was communicated to the students at the start and throughout the study.
- The intervention was not optional as it was part of the normal lessons.
- The results of the study were shared with all the students involved.
- Progress of the study was visible on the homework statistics which is assessable to all teachers.
- There were no negative consequences of this intervention as students already use the tools needed for the intervention at school.
- Data was anonymised and was accessed using the school computer.
- All data was stored in line with the school's policy.

This research was originally proposed to include Y9 and Y10 students at school X. It was also intended to use both maths and science homework data. However, during the initial project planning stage, it was discovered that homework data for previous years are automatically deleted so it became impossible to include Y10 student as there was no data available for that year group. Literature review also shows that focusing on one subject means that some factors influencing homework can be controlled thereby limiting the complex interactions between these variables (Thomas, 1992). Other considerations also include logistic around running the interventions and proper monitoring of data. Therefore, the research sample was limited to 29 year 9 students that I teach.

Results of the intervention

The results in the research were obtained from the weekly reports from the homework platform. The data included are:

- Completion rate for each student i.e., the percentage of the homework completed. If less than 100%, the percentage completed is shown.
- Aside the compulsory homework set every week, there are extra work known as XP boost and targeted work set for each student. These are not compulsory but recommended.
- There is also an opportunity for students to choose some independent tasks to work on at their own pace and level.

When students complete their weekly compulsory homework, they receive XP (experience) points which ranges from 240 to 420 for each Compulsory homework. Total XP for each XP Boost homework is 405 XP and for each Target homework is 135 XP. These are accumulated by students and determines the level they are on the platform. This is a form of reward scheme to serve as a motivation for the students to continue to engage. Students also collect XP points when they engage in independent learning using the homework platform. The number of questions attempted and the time spent are also recorded for each student.

The mid-year exam result was also collated and compared to the 28 students and these results were compared to their year 8 mid-year and end of the year exams.

A questionnaire was administered to assess the confidence level of the students in answering problem-solving questions.

Key findings and Discussion

Pre-intervention data showed that only one student engaged in the independent learning task. This was because the student did not know that the homework platform provided such opportunity and that there is reward for using it. After the intervention started (before the mid-year exams), 85% of the students began to do independent learning tasks and enjoyed the instant gratification brought about by a tick for every correct answer. This helped many of the students practice and prepare for the mid-year exam. However, after the mid-year exam, homework report showed that 69,2% of the students stopped engaging in the independent learning tasks. This showed that exam success was the major motivation for engagement. Post-intervention results showed that none of the students continued to use the independent task to practice at home.

This finding showed that the student felt no need to continue since they already achieved their desired outcome through the exam results and the intervention had stopped.

Statistical analysis carried out showed a 0.28 correlation between the pre-exam intervention and the performance of the students. This was because though 85% of the students engaged in independent learning at home, the number of points obtained (which is a measure of the number of questions attempted) varied from 100 to 5400 point. This made it difficult to assess the impact of independent learning on academic performance.

However, the questionnaire administered showed that 17.4% of students felt that their level of confidence in attempting problem-solving questions moved up two levels, another 65.2% experience a one level increase while only 17,4% experience no change in their level of confidence.

Conclusion

Academic performance is usually measured using tests and exams. However, there can be numerous factors that determines exam results. The result from this research shows that there is a complex relationship between homework engagement and academic performance. This is because there is more than one variable interacting. Homework engagement can be affected by the motivating factors available. Success is one of these as well as consequences of not engaging. Sometimes it is challenging to determine which one of the two is the real motivator for engagement.

The data obtained in this research provided little or no insight into the effect of independent learning/homework engagement on the academic performance of students at school X. However, a continued intervention for a longer period may be required to see the desired results of this research.

Nonetheless, a positive outcome of this research can be seen in the data collected about the confidence level of the students in answering problem-solving questions. Problem-solving is a key skill in maths and problem-solving questions tend to carry high marks in exams. Exams results over the years have shown that students lack the confidence to attempt problem-solving questions thereby limiting their success rate in exam. Therefore, it can be concluded that independent learning resulted in the increased confidence experienced by the students who participated in this intervention. This result showed a positive effect of homework engagement on academic performance.

References

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Appendix

Supporting notes:

The main instrument for this project is the data that will be collected from students' homework completion reports, pre-intervention and after the intervention has concluded. However, the weekly progress will also be monitored. Continuous assessment in form of KPI (end of unit) test will be used to monitor problem-solving skills. Mid-year examinations results for current and previous years will be compared. There will also be a pre- and post-intervention one-question survey to assess students' confidence level from their perspective. See the question below

Circle the number that best describes your level of confidence in answering worded/problem-solving questions:

Not confident	Neutral	Confident	Extremely confident
[1]	[2]	[3]	[4]