Effect of Peer-to-Peer Learning Between Students on Academic Performance with High School Students

The Westlake Boys Centre for Excellence in Teaching and Learning

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Abstract

This Action Research project investigates the effect of peer-to-peer tutoring on the academic performance and study confidence of junior Mathematics students. The study was carried out in a Year 10 core mathematics class, with 29 junior students participating. The research aimed to explore whether collaborative tutoring between senior and junior students could improve understanding and confidence in Maths. We chose this topic as we felt that overall academic engagement and performance at Westlake could be improved. In particular, we were interested in addressing an issue we identified which was the lack of motivation in many students to improve academic performance within the school. Our initial research proposal aimed to investigate the impact of ranking systems on academic performance; however, after reviewing literature and reports, we found that such systems often have more negative than positive effects, such as increased stress and competition. Thus, our focus shifted toward peer-to-peer learning, which multiple studies identified as a more effective and sustainable method for improving student achievement, motivation, and confidence through collaboration between students of both the same and different year levels.

Introduction

At Westlake Boys' High School (WBHS), the removal of academic ranking and class streaming has prompted discussion among many year levels as to how best maintain motivation and academic excellence without relying on competitive structures. Our Year 12 student research group

identified this as an opportunity to explore alternative approaches that emphasise collaboration over competition. We chose to investigate the effect of peer-to-peer learning on academic performance and study confidence among junior Mathematics students, aiming to determine whether student led learning between students of the same class, but also between junior and senior students, could enhance understanding, motivation, and confidence in Mathematics for junior students.

Our study involved 29 Year 10 students from a core Mathematics class. Emphasis was placed on both horizontal peer learning (students assisting classmates) and vertical peer tutoring (senior-to-junior guidance). A follow-up survey and post-test were then conducted to evaluate any shifts in confidence, engagement, and academic performance. We hypothesised that by explicitly teaching study methods and fostering collaborative learning, students would demonstrate measurable improvement in their mathematical understanding and self-confidence.

Literature Review

A consistent theme across the educational research that we found is that student achievement and motivation are closely linked to engagement, collaboration, and self-efficacy. Traditional methods that rely heavily on ranking often failed to cultivate these attributes.

According to a 2018 report by the New Zealand Council for Educational Research (NZCER), systems that prioritise competition and external benchmarking can lead to anxiety and reduced intrinsic motivation, particularly among younger learners. This finding supports the idea that while ranking may encourage short-term performance gains, it can also discourage collaborative learning and damage students' long-term confidence and willingness to engage.

In contrast, we found multiple studies that have highlighted the positive impact of peer-to-peer learning as an alternative which had comparable academic benefits to academic ranking. Topping (2015) found that structured peer learning enhances both cognitive and social development, as students learn effectively through explaining concepts to others and receiving feedback from peers. Similarly, research by Roscoe and Chi (2007) demonstrated that peer learning helps both the tutor and the learner, as the process of verbalising and simplifying explanations reinforces understanding and retention. A 2020 study by the Ministry of Education found that students involved in peer learning programs reported higher self-belief in their mathematical abilities and were more likely to attempt difficult problems. This suggests that the social and supportive nature of peer interaction helps reduce fear of failure.

An analysis by Ginsburg-Block et al. (2006) found that the positive effects of peer-to-peer learning were not limited to academic gains; students also displayed improvements in motivation, communication, and attitudes toward learning. In addition to peer learning, teaching effective study strategies has been widely recognised as a determinant of academic success. Therefore, combining peer-to-peer learning with explicit instruction in study techniques may amplify the benefits of both approaches.

Overall, the literature that we have found supports the hypothesis that collaborative, student-led learning fosters a more supportive, confident, and effective learning environment than traditional competitive systems. In the context of Westlake Boys' High School, where academic ranking has been removed, peer to peer learning between students of the same class and between junior and

senior students presents a promising path for sustaining motivation and achievement through cooperation rather than competition.

Research Question

How can peer-to-peer learning between students in junior Mathematics classes effect academic performance and learning outcomes at Westlake Boys High School?

The Action

Our study followed the methodology of a classic Action Research investigation, combining both quantitative (test scores) and qualitative data (surveys) to evaluate the impact of our action. The participants were 29 year 10 core Mathematics students and a small group of year 12 senior students acting as peer tutors.

Our Action Research was broken down into three key phases. **Phase one** was an initial student survey that was distributed to assess attitudes toward Mathematics, perceived confidence, and existing study habits. Responses showed that a majority of students rated their confidence as mid to low and reported difficulty in knowing how to revise effectively. Students then completed a short baseline Mathematics test consisting of a multichoice section (out of 10) and a written section (out of 15) focused on trigonometry and Pythagoras' theorem. These results established a baseline for academic performance.

Phase two of our Action Research involved senior students participating in an organised classroom peer-learning session. Within these sessions focus was placed on two forms of collaborative learning:

1. Junior to Junior peer learning, where students who had answered certain questions correctly in the short test helped peers who struggled with those items.
2. Senior to Junior tutoring, where senior students guided small groups through problem-solving steps and demonstrated effective study methods.

The emphasis of sessions was placed on active discussion, explanation, question-driven learning and collaboration between students rather than direct instruction. Senior students also spent time guiding and answering any questions on revision/study techniques.

Phase three of our research revolved around students completing a second different test mirroring the structure of the first. A follow-up survey gathered feedback on the experience, focusing on perceived helpfulness, enjoyment, and confidence gains. All data was then compiled and analysed, comparing average scores and survey responses before and after the action.

Data Analysis

In my discussion of results, students are referred to by initial where necessary. See appendices for data.

To evaluate the effect of peer-to-peer tutoring on student confidence and academic performance, the data from the first and second surveys were compared. The first survey measured students' initial attitudes toward academic performance and study habits, while the second survey which was conducted after peer tutoring and tests focused on how helpful students found the intervention and whether they had noticed improvement.

General Academic Self-Perception Before Tutoring

The initial survey reveals that students generally rated themselves in the middle academically. When asked how well they generally performed in school (Question 2), 39% rated themselves a 4 and 48% a 3 on a 5-point scale, suggesting that most students viewed themselves as average to slightly above average learners. Only 6% rated themselves a 5, while one student each rated a 1 or 2.

Similarly, when asked about their overall grades (Question 3), 65% identified as achieving at the Merit level, with 26% at Achieved and 6% at Excellence. Only one student reported Not Achieved. This data confirms that while most students were performing at a satisfactory level, few were achieving at the top level.

Despite this, there was strong motivation for self-improvement as 87% of students indicated they wished to improve their academic performance (Question 4). This attitude provided a positive foundation for the peer tutoring action to take place.

Study Habits and Effectiveness Before Tutoring

When asked which study techniques they used (Question 5), 35% reported using reading the material, while practice exams and note-taking were each selected by 24%. Only 8–10% used flashcards or other methods. This not only indicates a narrow range of strategies being applied but also shows how a third of students were just reading the material as studying which is a proved inefficient study method with limited active recall or spaced learning techniques.

Students also expressed moderate confidence in the effectiveness of their techniques. On a 1–5 scale, 48% rated their methods a 3 and 29% a 4 (Question 6). Only 13% rated 5, and 6% rated 1—showing that while most felt their methods worked "somewhat," few were highly confident in them.

Study duration data (Question 7) reinforces this picture: while 10 students studied for 1 hour, only 4 studied for over 2 hours, and 5 studied for less than 1 hour. No students reported not studying at all, but the trend suggests that study sessions were relatively short and possibly inconsistent limiting the grades the students are able to achieve.

Post-Tutoring Perceptions and Confidence

The second survey, conducted after peer tutoring, demonstrates a moderate but positive shift in confidence and perceived improvement.

When asked whether the sessions helped them learn how to study (Question 1), 33% responded Yes, 44% Somewhat, and 22% No. This suggests that while not all found the sessions transformative, the majority found at least some value.

In terms of confidence in studying (Question 2), 44% rated themselves a 4, 33% a 3, and 11% a 5. Compared to the earlier confidence data, this represents a noticeable upward trend, with fewer low scores and more students feeling "confident" or "very confident" about their study habits.

Qualitative responses from Question 3 support this: several students (e.g., F.Z. and N.B.) mentioned that they "learnt how to do questions they didn't know how to before" and "had a lot of confidence studying." Others like T.A. expressed a desire for continued support, suggesting that while progress was made, further sessions could strengthen these gains.

Finally, when asked if they noticed improvement in academic performance (Question 4), 56% said Yes and 44% No. While this is not a unanimous success, it does suggest that over half of the participants perceived tangible academic improvement, even within a short timeframe.

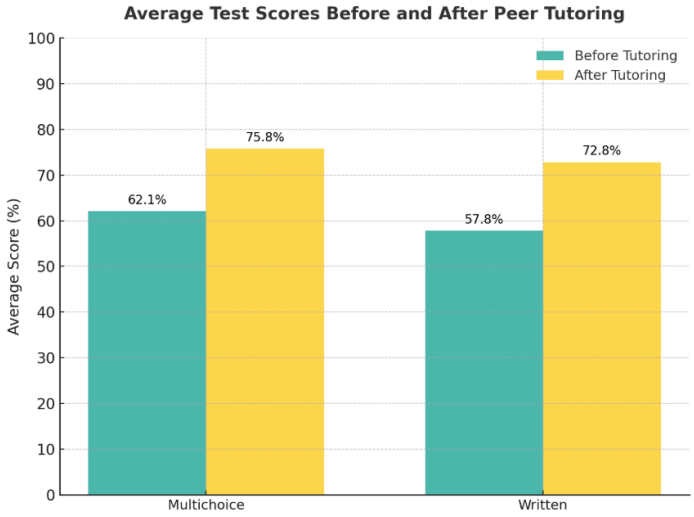
Comparative Analysis

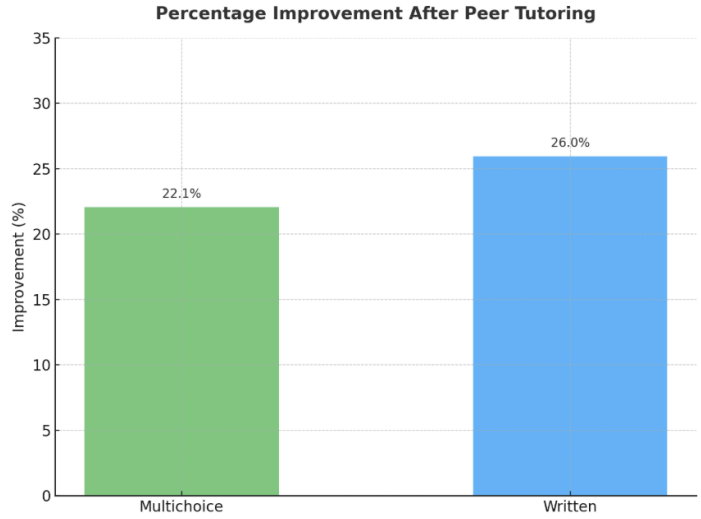
Comparing both sets of data, several trends emerge:

- **Confidence increased modestly:** Initially, the largest cluster of students rated their study effectiveness a 3 (48%), while post-tutoring, the majority rated their confidence as 4 (44%) or 5 (11%).
- **Awareness of study strategies broadened:** Qualitative comments from students in the replies to question 2 reveal greater reflection on the action we had performed and how it may or may not have helped them.
- **Academic self-efficacy improved:** The proportion of students believing they could improve academically (already 87% before tutoring) translated into measurable action, with more than half later reporting actual improvement.
- **Variation in impact:** A minority (22%) felt the sessions were unhelpful, often stating that they already knew the material or had done similar activities before. This suggests that tailoring future sessions to different ability levels could enhance effectiveness.

Findings

To draw a connection between attitudes and perceptions to improvement, we have collated the data from the students' test scores. There is clear improvement following the action of peer-to-peer support, and while this may not be the only influence on performance it is interesting to see. The improvement in written responses is higher than that of multiple-choice questions. This may reinforce research that discussion helps process thinking and can encourage improved written responses.





Conclusions

Following the process of this Action Research, it would be interesting to look for more opportunities for peer-to-peer learning across the curriculum. We hope that teachers will read our report and consider how they could implement similar strategies in their classrooms. With regards to senior to junior peer-to-peer support, the logistics of this are difficult but it would be helpful to look at ways and opportunities to overcome this challenge. One thing that stands out is that students need to be explicitly taught a range of ways to study and revise. This is something that curriculum leaders and teachers could look at building in more into their year and lesson plans.

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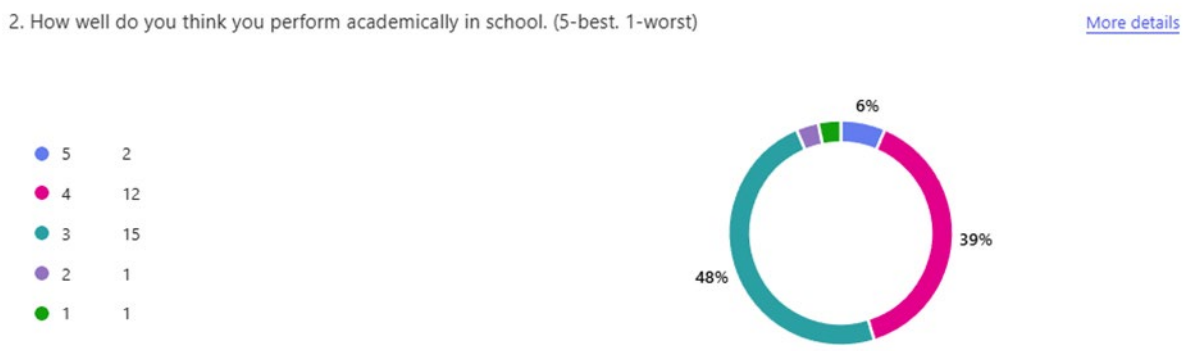
Appendices

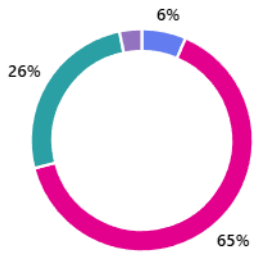
Appendix A: **First Survey before peer-to-peer help**



3. What is your average grade across all subjects?

More details

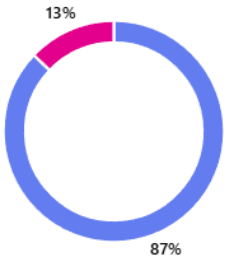
Excellence	2
Merit	20
Achieved	8
Not Achieved	1



4. Despite how well you perform in school academics, do you wish to improve?

More details

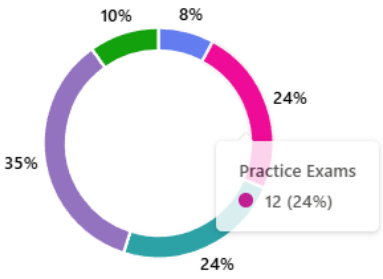
Yes	27
No	4



5. Which of the following study techniques do you use?

More details

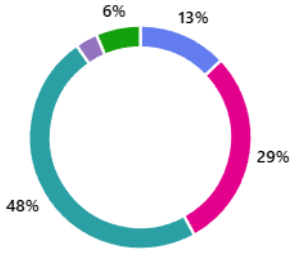
Flashcards	4
Practice Exams	12
Note Taking	12
Reading the Material	18
Other	5



6. On a scale from (1-5), how effective are these study techniques?

More details

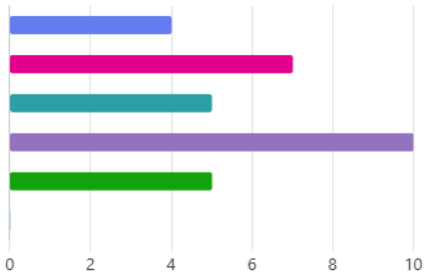
5	4
4	9
3	15
2	1
1	2



7. During exams, when you do, how long do you study for?

More details

Over 2 hours	4
2 hours	7
Less then 2 hours	5
1 hour	10
Less then 1 hour	5
Don't study at all	0

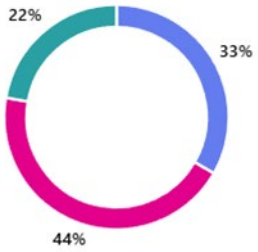


Appendix 2: **Second Survey after peer-to-peer tutoring**

1. Did you find us helpful at helping you learn how to study?

More details

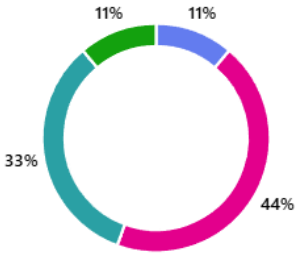
Yes	3
Somewhat	4
No	2



2. After we visited and spoke with you, how confident do you now feel about studying on a scale of (1-5)

More details

5	1
4	4
3	3
2	0
1	1



3. From Question 2, why did you give yourself that rating?

9 Responses

ID ↑	Name	Responses
1	[redacted]	It was average
2		I think i'm doing well but not amazing.
3		Because I was not there when you visited and spoke with the rest of the class. I put 4 because that is how confident I am with studying anyway.
4		its not that deep, just gotta do practice problems
5		Because I have a lot of confidence studying
6		cause i already did something similar
7		Because I already knew most of the things that they said
8		Because i have learnt how to do questions that i didn't know how to do before.
9		because i didnt really talk much im struggling alot i would love if you could come one more time and help me improve my math i would love to get an amazing grade for my end of years.

4. Have you noticed any improvements in your academic performance?

More details