

Social Persuasion: A Strategy in Optimizing Students' Self-Efficacy and Mathematics Performance

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ABSTRACT

This study aimed to investigate the impact of social persuasion as a strategic intervention on Grade 7 students' self-efficacy and Mathematics performance. A pre-test- post-test experimental design was employed, with a self-efficacy questionnaire administered to assess students' perceived capabilities in solving mathematical problems. The social persuasion strategy was implemented over a period of 5 weeks, involving persuasive messages and feedback aimed at enhancing students' confidence and self-efficacy in Mathematics. After the implementation, results showed a significant positive relationship between self-efficacy and Mathematics performance, indicating that students' confidence in their abilities was strongly linked to their academic achievement. The post-test results revealed a significant increase in self-efficacy and Mathematics achievement compared to the pre-test scores, demonstrating the effectiveness of social persuasion in enhancing students' self-efficacy and Mathematics performance. The study concluded that social persuasion is a powerful strategic intervention in promoting students' self-efficacy and academic achievement in Mathematics. The findings suggest that incorporating social persuasion techniques in Mathematics instruction can foster a positive learning environment, boost students' confidence, and improve their academic achievement. The results have implications for teaching practices, highlighting the importance of promoting self-efficacy in students to enhance their academic success.

KEYWORDS

Social persuasion; self-efficacy; mathematics performance; one group pre- test post-test experimental design.

INTRODUCTION

Social persuasion is a type of social influence where people are purposefully encouraged to accept an idea, feeling, or decision through symbolic methods (National Alliance for Partnership in Equity, 2020). To work well, social persuasion should be used along with real experiences of success. This helps make feedback about what someone is good at or needs to improve more useful, especially when it is connected to a specific learning situation or past performance.

A person who possesses a high level of self-efficacy tends to exhibit a stronger interest in and a greater motivation for pursuing and attaining challenging goals. This heightened belief in their own abilities enables them to tackle difficult tasks with confidence and persistence, ultimately driving them to strive for and achieve higher levels of success. Providing feedback that is both precise and aimed at enhancing task-related knowledge and skills, coupled with genuine, appropriate and realistic support, as well as explicitly setting

high standards and offering personal assurance that students can improve with effort, will motivate students to persevere through difficulties and setbacks. Informing parents and guardians about the importance of supporting their children has been found to be a more important factor in building a child's self-efficacy than how much the child is involved in the activity. This involvement from parents highlights how a supportive environment plays a key role in helping a child feel confident and motivated to achieve their goals. Recognizing and praising effort rather than just focusing on outcomes is also an important way to help students develop the skills needed to complete specific tasks (NAPE, 2020).

Changes in self-efficacy also happen through non-verbal methods, as these practices show social persuasion—meaning the teacher shows confidence in the students' abilities. This suggests that students start to believe in themselves when others, like the teacher, believe in them, and they need to see that belief. This approach helps more students engage in thinking during class and also makes them think for longer periods during lessons (Liljedahl et al, 2016).

Self-efficacy does not pertain to the quantity of knowledge and skills a person possesses. Rather, it is connected to an individual's belief in their ability to effectively utilize their knowledge and skills in various situations. For instance, in the co student facing academic challenges, self-efficacy is about their confidence in applying what they have learned to meet those demands successfully. This belief in one's capability significantly influences how they approach tasks, overcome obstacles, and achieve their goals, regardless of the actual level of their knowledge and abilities. Because social beliefs can be influenced, it is important to handle social persuasion effectively. This includes using good communication skills by lecturers, particularly through their language style, to deliver clear and positive verbal messages to students (Alimin et al, 2019).

Academic motivation and cognitive engagement, both vital components of student involvement, are key predictors of academic success, underscoring their strong interconnection. Students who possess confidence in their abilities and demonstrate a readiness to engage in academic activities are more inclined to commit to their studies diligently. This intrinsic motivation drives them to engage in the cognitive processes necessary for academic achievement. When students believe in their potential to succeed and are motivated to invest effort, they are better prepared to confront challenging tasks, utilize effective learning strategies, and ultimately attain higher academic performance. It is suggested that both teachers and parents should work together to boost students' self-efficacy and motivation, which can help improve their academic performance (Shkëmbi & Treska, 2023).

The proponent observed that this intervention is not used and practiced to different campuses including the environment of this study. Furthermore, Student math performance has dropped a lot, as shown by the test results. This seems to be because of their lack of motivation and low self-belief when inside the classroom. Lack of support from their parents and encouragement to do a certain task at home is also among the factors that contributes to it. With this, the researcher intended to improve their Mathematics performance by boosting their self-efficacy through social persuasion. Moreover, this study aimed to produce a contextualized guide for teachers on how social persuasion as a matter of intervention will be implemented effectively.

RESEARCH METHODS

Research Design

This study utilized the one-group pretest-posttest design. A one-group pretest- posttest design is a quasi- experimental research design in which the same dependent variable is

measured in one group of participants before (pretest) and after (posttest) a treatment is administered (McCaleb et al, 2008). In this study, the researcher used the design to determine the effectiveness of the intervention, social persuasion, in improving the scholars' self-efficacy and performance in Mathematics.

It also employed a correlational research design to investigate the relationship that can be either positive or negative, between variables without the researcher controlling or manipulating any of them.

Environment

This study took place at Decker Middle School (DMS) in Manor, Texas. DMS is one of the performing middle schools in the Manor Independent School District, which is part of the state of Texas. The school serves students in grades 6 through 8 and has 57 teachers and staff members. During the 2023-2024 school year, there were 658 officially enrolled students. The school aims to create a community of lifelong learners who feel proud and honest, in a safe, welcoming, creative, and inclusive environment, so they are prepared for college and careers.

Decker Middle School holds a ranking between 1451 and 1935 among middle schools in Texas, based on criteria that include performance in state-mandated assessments, graduation rates, and the school's effectiveness in preparing students for high school. These metrics collectively determine the school's standing within the educational landscape of Texas.

Participants

The study involved 37 middle school students who were chosen using purposive sampling. This is a type of non-probability sampling where individuals are selected because they meet specific characteristics needed for the study (Nikolopoulou, 2023). The students were picked based on three main rules: they had to be in 7th grade, score below the proficient level in math, and have their parents' permission to take part. Any student who didn't meet all these conditions was not allowed to join the study.

Instrument

The researcher used test questionnaires that had been validated and tested for reliability. These questionnaires were used to measure the students' performance in Mathematics both before and after the intervention, which involved social persuasion. The questionnaires consisted of 40 multiple choice questions from previously tested State of Texas Assessment for Academic Readiness (STAAR). Competencies covered in the study were: Approximating Rational Numbers, Scientific Notation, Ordering Real Numbers, and Pythagorean Theorem.

In addition, the researcher used a standard questionnaire to determine the self-efficacy level of the student-participants before and after the implementation of the social persuasion. This questionnaire is adapted from a study conducted by May (2009) entitled Mathematics Self-efficacy and Anxiety Questionnaire and has obtained an average reliable index of 0.65. Furthermore, the questionnaire has seven indicators and five response options.

Data Gathering Procedures

Pre-Data Gathering

The researcher obtained the permission of the dean of the Graduate School of Education and the school principal to conduct the study. Afterwards, the manuscript was submitted to

the Research Ethics Committee of the University of the Visayas to check the ethical soundness of the paper. As soon as the Notice to proceed was granted, The selection of participants was done first, and consent forms were provided to the parents of the students who were purposefully chosen based on the set criteria.

Actual Data Gathering

After the list has been finalized, the researcher immediately scheduled and administer the pretest to the 37 purposively selected middle school students. Then, the intervention was implemented for five (5) weeks while delivering the lessons covered in the pretest. Competencies covered in the study were: Approximating Rational Numbers (Week 1), Scientific Notation (Week 2), Ordering Real Numbers (Week 3), and Pythagorean Theorem (Week 4). Week 5 covered the activities and assessments regarding the lessons learned. Necessary support, motivation and encouragement from the teacher was given. Then, post-test was handed-out.

Post-Data Gathering

Once all the data was gathered, the researcher tallied the data accordingly and sent it to the statistician for the treatment of data. The student's data was kept confidential and was disposed appropriately after the study. Online administered test through Eduphoria was all cleared and deleted.

Data Analysis

After completing the detailed data collection process, the researcher analyzed the data using statistical methods. The following statistical techniques were applied: (1) calculation of the mean and standard deviation, (2) Paired Sample T-test, and (3) Pearson's Product Moment Correlation Coefficient, which is also referred to as Pearson's r

Mean and standard deviation were employed to assess the students' levels of self-efficacy in Mathematics and their performance levels in Mathematics based on the outcomes of both the pre-test and post-test assessments.

Paired-sample T-test was employed to determine if there is significant improvement on the self-efficacy and performance in Mathematics of the students after the implementation of the social persuasion.

Moreover, the *Pearson's r* was used to determine the relationship between the students' self-efficacy and performance in Mathematics. The alpha (α), 0.05) was employed to test the significance.

Ethical Considerations

This study has been submitted, reviewed, and approved by the University of the Visayas Institutional Review Board. The three major principles of ethics were strictly observed during the data collection process such as respect for persons, beneficence, and justice.

RESULTS AND DISCUSSION

Self-Efficacy Level of the Students in Mathematics

To measure the students' self-efficacy levels, the Mathematics Self-efficacy and Anxiety Questionnaire adapted from May (2009) research was employed. This questionnaire has seven indicators and five response options. This questionnaire was administered both before and after the implementation of social persuasion strategies, allowing to assess the

potential changes in students' self-efficacy perceptions. The mean and standard deviation are utilized, and the results are shown in Table 1.

Table 1 showed that almost all indicators of self-efficacy are described as ‘sometimes’ which mean that the students showed moderate self-efficacy level before the implementation of social persuasion as confirmed by the mean of 3.05 and a standard deviation of 0.97.

Table 1. Self-Efficacy Level of The Students in Mathematics before and after the Implementation of Social Persuasion

Indicators	Before			After		
	Mean	SD	DE	Mean	SD	DE
I believe I am the kind of person who is good at mathematics.	2.81	1.10	Sometimes	3.49	0.84	Oftentimes
I believe I am the type of person who can do mathematics.	2.97	1.14	Sometimes	3.89	0.81	Oftentimes
I believe I can learn well in a mathematics course.	3.08	1.19	Sometimes	3.97	0.93	Oftentimes
I feel that I will be able to do well in future mathematics courses.	3.41	1.24	Oftentimes	4.19	0.84	Oftentimes
I believe I can understand the content in a mathematics course.	3.03	1.21	Sometimes	3.76	0.93	Oftentimes
I believe I can get an “A” when I am in a mathematics course.	3.03	1.32	Sometimes	4.11	0.84	Oftentimes
I believe I can do mathematics in a mathematics course.	3.05	1.18	Sometimes	4.03	0.96	Oftentimes
Factor Mean	3.05	0.97	Moderate	3.92	0.67	High

Note. n = 37. DE – Descriptive Equivalent. 1.00-1.80 – Never (Very Low); 1.81-2.60 – Seldom (Low); 2.61-3.40 – Sometimes (Moderate); 3.41-4.20 – Oftentimes (High); 4.21-5.00 – Usually (Very High).

The moderate self-efficacy level exhibited by the students before the implementation of social persuasion, as indicated by the "sometimes" descriptors and the mean score of 3.05, suggests that they had a neutral or average belief in their mathematical abilities. This implies that the students were not overly confident nor extremely doubtful about their capabilities but rather held a moderate view of their potential. This initial moderate self-efficacy level has important implications such as students were not yet convinced of their ability to excel in mathematics, indicating a need for targeted interventions to enhance their confidence. The moderate level can further suggest potential for growth and development, as students were not entrenched in extreme views. The relatively narrow standard deviation (0.97) indicates a relatively homogeneous group, making it easier to target interventions.

Furthermore, all indicators of self-efficacy are described as ‘oftentimes’ which means that the students showed high self-efficacy level after the implementation of social persuasion as confirmed by the mean of 3.92 and a standard deviation of 0.67. Indicator #6 ‘I believe I can get an “A” when I am in a mathematics course’ showed the highest mean increased after the implementation of social persuasion which implied the student’s confidence to excel in Math.

The shift from "sometimes" to "oftentimes" in the self-efficacy indicators after the implementation of social persuasion signifies a remarkable improvement in students' belief in their mathematical abilities. The mean score of 3.92 and standard deviation of 0.67 confirm a high self-efficacy level, indicating that students became more confident and

assured in their capabilities. This notable increase in self-efficacy implies the students' confidence in their mathematical abilities was significantly enhanced, likely leading to improved academic performance and a more positive attitude towards mathematics. The narrow standard deviation (0.67) suggests a consistent and widespread impact of social persuasion on students' self-efficacy, demonstrating the effectiveness of the intervention.

With that, educators can leverage this increased self-efficacy to challenge students with more complex mathematical concepts, fostering deeper understanding and greater academic growth. The finding supports the study conducted by Shkemi, et. al (2023) which investigated the connection between how well students do in school, their participation in learning activities, their drive to succeed academically, and their belief in their own ability to achieve which showcased the potential of social persuasion as a valuable teaching strategy to enhance student self-efficacy and promote academic success in mathematics.

Mathematics Performance of the Students

To evaluate the impact of social persuasion on students' mathematics performance, a validated and reliability-tested questionnaire was utilized comprising 40 multiple-choice items, to measure students' mathematics abilities both before and after the implementation of the social persuasion intervention. The questionnaire's established validity and reliability ensured accurate and consistent measurements, enabling a comprehensive assessment of the intervention's effectiveness in enhancing students' mathematics performance. Moreover, the mean and standard deviation were utilized in the analysis of data, and the results are shown in Table 2.

Table 2. Mathematics Performance of the Students before and after the Implementation of Social Persuasion

Performance Scores (%)	Before		After	
	f	Percent (%)	f	Percent (%)
90-100	0	0.00	6	16.22
80-89	0	0.00	5	13.51
70-79	1	2.70	11	29.73
60-69	2	5.41	9	24.32
0-59	34	91.89	6	16.22
		Interpretation		Interpretation
Mean	32.86	Failing	72.38	Average
SD	15.45		12.90	

Note. n = 37. 0-59% - Failing (F); 60-69% - Below Average (D); 70-79% - Average (C); 80-89% - Good (B); 90-100% - Excellent (A).

Table 2 revealed that the students' performance before the implementation of social persuasion is interpreted as failing with a mean of 32.86. This low mean score indicates that the students were struggling with the mathematical competencies, suggesting a significant knowledge gap. This implies that students lacked a solid foundation in mathematics, making it challenging to understand the covered concepts.

The low starting score shows how important it is to use good teaching methods, like social persuasion, to help students learn better. Also, the table shows that students' performance improved after using social persuasion is interpreted as average with a mean of 72.38. The significant improvement in scores after the intervention as shown in Table 2 demonstrates the effectiveness of social persuasion in addressing the knowledge gap and promoting student learning. This implies that educators should prioritize identifying and

addressing knowledge gaps in students' understanding of mathematical competencies and innovative teaching intervention like social persuasion can be effective in improving student learning outcomes.

Self-Efficacy and Performance in Mathematics 7 of the Students after the Implementation of Social Persuasion

This study investigates the impact of social persuasion on the self-efficacy and performance of students in mathematics. Specifically, it examines the effectiveness of social persuasion in enhancing the mathematical self-efficacy and academic performance of seventh-grade students. Additionally, a paired-sample T-test is used to check if there is a significant increase in self-efficacy and performance in Mathematics of the students after the implementation of the social persuasion.

Table 3. Improvement in Self-Efficacy and Performance in Mathematics 7 of the Students after the Implementation of Social Persuasion

Variables	Observations	Mean	SD	df	t-value	p-value	Interpretation
Self-Efficacy	Before	3.05	0.97	36	-10.91	0.000	Significant
	After	3.92	0.67				
Performance Score	Before	32.86	15.45	36	-21.82	0.000	Significant
	After	72.38	12.90				

Note. n – 37. **significant at 0.05 alpha level of significance

The tabular values reveal that the self-efficacy level of the students has significantly improved after the implementation of social persuasion ($p < 0.05$) and has a mean difference of 0.87. This means that the students' belief in their ability to do well in math has gone up a lot since social persuasion was used. It shows that social persuasion helped build their confidence and how they see their own math skills, which plays a big role in how well they do in school and how motivated they are.

The significant improvement in self-efficacy level ($p < 0.05$) indicates that the intervention has had a statistically significant effect. This finding supports the effectiveness of social persuasion as a teaching intervention strategy to help students to build confidence in their math abilities can lead to better academic results and more opportunities in careers related to math over time.

Further, the results implied that social persuasion can be a valuable teaching strategy to enhance students' self-efficacy in mathematics and educators can use social persuasion strategy to build a learning space that helps students feel encouraged and sure of their ability to understand math.

Additionally, table 3 showed that the students' math skills have greatly improved after using social persuasion ($p < 0.05$) and has a mean difference of 39.52. This means that the students' performance in math has greatly improved after using social persuasion. It shows that social persuasion has made a big difference in how well students understand the subject and application of mathematical concepts, leading to improved academic performance.

The significant improvement in mathematics performance ($p < 0.05$) indicates that the intervention has had a statistically significant effect. This finding supports the effectiveness of social persuasion as a teaching strategy to enhance students' academic achievement in mathematics.

The results implied that social persuasion can be a powerful tool to improve students' academic performance in mathematics. The significant increase in mathematics performance suggests that students have developed a deeper understanding of mathematical concepts and are able to apply them more effectively. Also, educators can use social persuasion techniques to build a learning environment that helps students feel supported, encouraged, and confident in their math studies, which in turn helps them stay motivated and achieve success in their academic work.

Overall, the findings suggest that social persuasion has had a positive impact on both self-efficacy and academic performance in mathematics, highlighting its potential as a valuable teaching intervention strategy in mathematics education.

Relationship Between Self-Efficacy and Performance in Mathematics of the Students

A Pearson's correlation coefficient (r) analysis was done to look at how connected students' self-efficacy is with their performance in Mathematics. The significance of the correlation was tested at an alpha level (α) of 0.05. The results, shown in Table 4, show how strongly and in which direction these variables are connected, helping to understand if students' confidence in their math skills is linked to their performance in the subject.

Table 4 shows a clear link between students' self-efficacy and their math performance. It shows that when students believe more in their ability to do well in math, their actual performance in the subject also improves. This suggests that having confidence in one's math abilities can help boost real performance in the subject.

Table 4. Relationship Between Self-Efficacy and Performance in Mathematics of the Students

Independent Variable	Dependent Variable	r	p-value	Interpretation
Self-efficacy	Performance	0.57	0.006	Significant

Note. $n = 37$. **significant at 0.05 alpha level of significance

When teachers and peer support are combined with a school environment that encourages social values, students are more motivated to achieve positive social goals and take part actively in classroom activities. Self-efficacy is very important in building student motivation and improving the learning experience (Shkëmbi and Treska, 2023). This shows how important it is to develop a growth mindset and strengthen self-efficacy in math education. It also highlights how self-efficacy can predict success in the subject, helping teachers spot and support students who might be having trouble with math concepts.

CONCLUSION

Based on the results, we can conclude that the study shows social persuasion is effective in boosting Grade 7 students' self-efficacy and their math performance. The noticeable improvements in self-efficacy and math performance, with moderate and large effects respectively, show that social persuasion can be a useful teaching method to help students feel more confident and achieve better results in math.

The results also show how important it is to develop a growth mindset and build self-efficacy in math education. When teachers use social persuasion in their teaching, they can create a more encouraging learning environment. This helps students believe in their ability to do well in math, which can lead to better academic results and a better grasp of math topics.

The study's results have significant implications for mathematics education, suggesting that social persuasion can be a powerful tool to address the longstanding issue of low mathematics achievement among students. By harnessing the potential of social persuasion, educators can develop innovative teaching strategies that promote self-efficacy, motivation, and academic success in mathematics. To wrap up, this study provides robust evidence for the effectiveness of social persuasion in improving self-efficacy and mathematics performance among Grade 7 students. The findings offer valuable insights for teachers, educators, and policymakers seeking to enhance mathematics education and promote academic achievement among students. By embracing social persuasion as a teaching strategy, we can empower students to reach their full potential in mathematics and beyond.

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