

Sources of Mathematics Self-Efficacy and Course Achievement of Computer Engineering Students

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Abstract: *The study, "Sources of Mathematics Self-Efficacy and Course Achievement of Computer Engineering Students," explores the relationships between students' sources of mathematics self-efficacy and their achievements in both mathematics tests and courses. The research aims to investigate the potential direct predictive impact of sources of mathematics self-efficacy on students' performance in mathematics. The study revealed a positive and significant relationship between sources of mathematics self-efficacy and mathematics course achievement among computer engineering students. This suggests that students who have higher self-efficacy beliefs tend to perform better in their mathematics courses.*

Keywords: Sources of Mathematics self-efficacy, course achievement, computer engineering, students.

Introduction

One effective method for assessing the achievement of educational and developmental objectives is through performance tasks. These educational goals have indeed been met, underscoring the significance of educational outcomes. Academic performance is often measured through exam results, making Sources of Mathematics self-efficacy, course achievement, computer engineering, students.

it imperative to investigate the factors influencing students' academic success.

During the first term of the academic year 2022–2023, it became apparent that many students encountered challenges in solving mathematical problems, irrespective of whether classes were held online or in-person. A notable trend was their heavy reliance on smartphones to seek solutions to math problems or their dependence on calculators.

It's important to note that individuals' self-confidence in their abilities tends to vary among different activities, domains, and situational contexts, rather than remaining consistent across various tasks and situations.

In this study, the researcher's goal is to emphasize the positive association between self-efficacy in mathematics achievement and its various sources. Students are exposed to a variety of self-efficacy sources intended to enhance their self-efficacy in different academic domains.

Previous research includes investigations into the relationship between self-efficacy sources and academic achievement. For instance, Zcan & Kontaş (2020) conducted a study that revealed a correlation between sources of mathematics self-efficacy and academic performance.

The primary focus of this study is to identify the sources of mathematics self-efficacy and their impact on the mathematics test and course achievements of computer engineering students. This research aims to address the following questions:

1. What is the relationship between sources of mathematics self-efficacy and mathematics course achievement?
2. What is the relationship between sources of mathematics self-efficacy and mathematics test achievement?
3. What are the differences when comparing the relationship between sources of mathematics self-efficacy with mathematics test achievement and mathematics course achievement?

This study would provide benefits to the following:

Students: This research would foster an enhanced understanding of self-efficacy sources and the importance of active engagement, emphasizing the necessity for students to participate in learning activities that extend beyond the classroom, promoting a student-centered learning approach.

School Administration: The findings and revisions would present a more robust measure of students' accomplishments, inspiring them to develop more effective intervention programs that aim to enhance the learning process.

Future Researchers: The results of this study will provide an invaluable reference for aspiring researchers seeking to conduct subsequent inquiries and analyses in this field, providing them with a solid groundwork for their own research pursuits.

The theoretical basis for evaluating how mastery and vicarious experiences influence students' self-efficacy is rooted in the assertion made by Chen & Usher (2013) that an individual's encounters of success or failure impact their perception of their ability to carry out tasks.

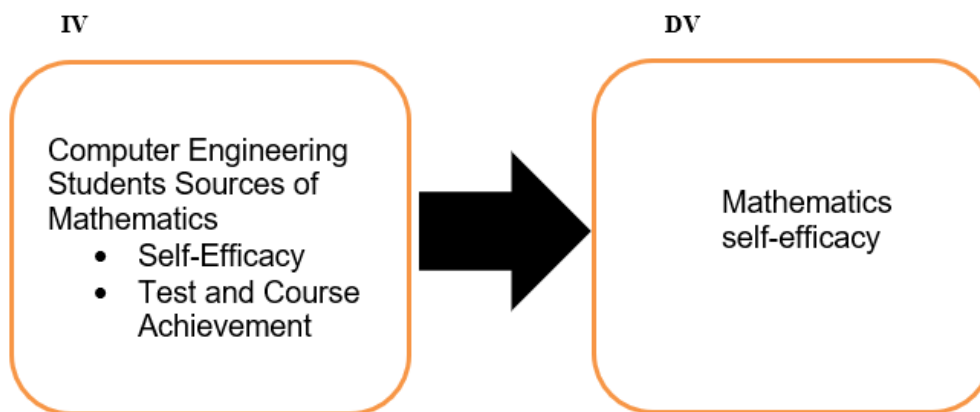


Figure 1. The conceptual Paradigm

Figure 1 shows the conceptual paradigm of the study. The independent variables show the variables used in computer engineering students' sources of mathematics consist of the following; self – self-efficacy and test and course achievement. The dependent variable shows the mathematics efficacy, this would be the assessment of the student's activities done via face-to-face and asynchronous activity.

This study would employ developmental research procedures, following the approach described by Ibrahim (2016) as an active, iterative process involving the development of theoretical concepts leading to the creation of instructional products that are subsequently tested in a classroom setting, ultimately resulting in theoretically and empirically grounded instructional materials.

In this research, the nonrandom purposive sampling method was utilized for participant selection. The study would involve first, and second-year computer engineering students aged 18 years and older, enrolled in NU Baliwag during the academic year 2022-2023. Selection of participants would be based on their enrollment in the mathematics subject within the Computer Engineering course.

To assess middle school students' sources of mathematics self-efficacy beliefs, the Sources of Mathematics Self-Efficacy Scale, created by Usher and Pajares (2009), will be utilized. This scale comprises 24 items measured on a 7-point Likert-type scale, including seven items with reverse scoring. It encompasses four subscales: mastery experience, vicarious experience, social persuasions, and physiological state, with each subscale containing six items. The total score for each dimension on the Sources of Mathematics Self-Efficacy Scale falls within the range of 7 to 42.

The researcher would initiate the study by drafting a request letter, endorsed by the researcher's dean and program chair, to seek approval for conducting the research. Once the academic director granted permission to proceed, a courtesy letter was issued to the identified group of participant students, initiating the distribution of the questionnaire. Additionally, a consent form would be provided to the respondents to formally document their voluntary participation in the study. To ensure a 100 percent questionnaire retrieval rate, the research coordinator would provide the necessary assistance.

Considering the current COVID-19 pandemic and adhering to health and safety protocols, the physical distribution of the survey questionnaire would be avoided. Instead, the survey questionnaire would be converted into a Microsoft Form for online interaction with the teacher-respondents, constituting Part 1 of the survey. This online survey instrument would be disseminated through platforms such as MS Teams Messenger or email, ensuring easy access for the respondents with an internet connection.

Data analysis software would be utilized to facilitate the analysis of the collected data, and the researchers would seek the guidance of a statistician for the statistical analysis of the data.

The information collected from the questionnaires would undergo computerized processing using the Statistical Packages for Social Sciences (SPSS).

Findings:

1. The study revealed a positive and significant relationship between sources of mathematics self-efficacy and mathematics course achievement among computer engineering students. This suggests that students who have higher self-efficacy beliefs tend to perform better in their mathematics courses.
2. Similarly, a positive and significant relationship was found between sources of mathematics self-efficacy and mathematics test achievement. This indicates that students with stronger self-efficacy beliefs tend to excel in mathematics tests.
3. When comparing the relationship between sources of mathematics self-efficacy with mathematics test achievement and mathematics course achievement, the study found that the correlation with course achievement was slightly stronger than that with test achievement.

Conclusions:

Based on the findings, it can be concluded that sources of mathematics self-efficacy significantly influence the academic performance of computer engineering students in both mathematics courses and tests. This highlights the importance of nurturing and enhancing students' self-efficacy beliefs to improve their mathematics achievements.

Recommendations:

1. Educators should consider implementing strategies that aim to boost students' self-efficacy beliefs in mathematics. This can include providing positive feedback, offering additional support, and fostering a growth mindset.
2. Further research could explore the specific interventions and teaching methods that are most effective in enhancing students' self-efficacy in mathematics.
3. Institutions and policymakers should prioritize programs and initiatives that focus on strengthening students' self-efficacy in mathematics, as this has the potential to improve overall academic performance.

Acknowledgments

The researcher would like to express his deep gratitude to the National University Philippines for their generous support and funding of this research. The university's unwavering commitment to advancing knowledge and academic excellence has played a vital role in enabling the successful execution of this study. The financial support provided has empowered him to conduct our research effectively and contribute significantly to the broader academic community. He holds the National University's dedication to research and education in high esteem and acknowledges his indispensable contribution to the success of his project.

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