

FACTORS CONTRIBUTING TO HIGH FAILURE RATE OF MAT 183 BASED ON STUDENTS' POINT OF VIEW: A CASE STUDY IN UITM PAHANG BRANCH RAUB CAMPUS

Nor Hidayah Hassim^{1*}, Syazwani Zainal Abidin¹

¹*Faculty of Computer and Mathematical Sciences,
Universiti Teknologi Mara UiTM Pahang, 27600 Raub, Pahang, Malaysia*

**Corresponding author: hidayah@uitm.edu.my*

Abstract

This study was done to identify the factors contributing to the failure rate of MAT183 subject based on the students' point of view. The method used in this study is qualitative research. This study focuses on Computer Science students who failed at least once in this subject to discuss this matter. The data was obtained by gathering a focus group and conduct an open-ended survey. Based on the discussion and interpretation of data, the findings of this study showed that the factors that contribute to the failure rate are the educational background of the students, fear of Mathematics, and lack of exercise or homework in MAT183. To overcome this problem, students need to change their way of studying or learning skills because the main problem lies in their understanding of the fundamentals or basics of Mathematics. The factors that emerged can be controlled by the students themselves. In addition, lecturers' involvement in creating a very positive vibe during teaching can also help to boost interest in MAT 183.

Keyword: Calculus 1, failure rate, factors, MAT183, qualitative research.

Introduction

Mathematics is one of the fundamental subjects in any program taught in universities. Mathematics helps improve problem-solving skills, and it is also applied in certain areas in every profession. Mathematics is all around us, and people use it every day in many places, such as the market and bank. One of the branches of Mathematics is Calculus. Calculus can be defined as a study of rates of change and can be divided into two branches, namely differential and integral calculus (Deb, 2019). In the University of Technology MARA, MAT 183 was introduced as a code for Calculus I. For the past few semesters, MAT183 has been reported as having high failure rate for Computer Science students at the University of Technology MARA Pahang Branch Raub Campus. This problem is quite alarming since students are required to pass MAT183 before they can take Introduction to Probability and Statistics (STA116) as these subjects are correlated with each other. Therefore, this problem can cause students to extend their studies and hinder them to graduate on time. Moreover, an extension of studies requires a lot of time and money and in some instances, students may be dismissed by their universities. In light of these issues, there is a need to investigate the factors that contribute to this problem. Several factors that have been discussed by other studies focused more on students' attitudes, students' backgrounds, and teacher-related factors. However, this study was done to identify the factors that contribute to the failure rate for MAT183 based on the students' point of view because technically, students who have failed MAT183 can identify the possible factors that hinder them from passing this subject.

Materials and Methods

The research methodology used in this study is qualitative research. According to Pathak et al. (2013), the purpose of qualitative research is to understand people's beliefs, experiences, attitudes, behaviors, and interactions. Thus, this produces non-numerical data. Besides, qualitative research gives an insight from an idealistic approach. Quantitative research is commonly used by researchers because it only focuses on numbers and figures. Qualitative research, on the other hand, has a big impact on helping researchers to perceive the data more extensively. Crossman (2019) also supported that the idea of qualitative research is focused on the small level of social interaction, which includes everyday life. To solve the problem, researchers should go directly to the source itself, which in this context refers to the people who are involved in that problem. She also suggested that the qualitative approach lead to the inductive method as well as creating new theories, which as a result, can be examined with further research. Qualitative approach is not only about "what" people think but also "why" they think so (Bhat, 2019). Since the qualitative approach focuses more on responses from respondents, researchers try to understand their motivation and feelings at the same time. The qualitative approach obtains data through open-ended questionnaires and discussion or interviews, thus, the results are much more descriptive, and the conclusion is made by the data obtained. Based on Defranzo (2011), the qualitative method can be varied because data can be collected either using unstructured or semi-structured techniques. Among the common methods used in qualitative approach are observation, interviews, open-ended surveys, focus groups, content analysis of visual and textual materials, and also oral history. This method usually requires a small sample size, and the chosen respondents are people who understands the situation well. Since qualitative data are obtained by using the sense of researchers which involve their eyes, ears, and knowledge to collect the data, researchers can use at least two or more methods in conducting qualitative research. This study focuses on Computer Science students who failed at least once in this subject to discuss this matter. The data was obtained by gathering a focus group and conducting open-ended surveys. During the study, the students' names were withheld to respect their privacy. A total of 29 students were gathered in one classroom, and they were asked about the factors that lead to their failure in the MAT183 paper. The students then wrote down their answer on a piece of paper. Subsequently, the data were analyzed, and the following factors emerged in this study.

Result and Discussion

Based on the discussion and interpretation of data, the findings of this study are as follows:

Table 1 Response recorded from the participants

Factors	Numbers of Participants	Responses
Educational Background of Students	9	<i>"MAT183 is not that hard, I just have a weak understanding of Additional Mathematics since secondary school and deep down in my heart, I have no interest in learning Mathematics."</i>
	23	<i>"MAT183 is considerably difficult because it requires good skills in Mathematics, especially Additional Mathematics, and to solve the problem, we need to have a high imagination."</i>
Fear of Mathematics	5	<i>"I'm understand the questions given and are able to show calculation. However, I have a problem during my final exam. I get nervous easily. So, when I'm nervous,</i>

	20	<i>everything keeps messing up and confuses me.”</i> <i>“I have some fear in Mathematics. During my secondary school, I was placed in a weak group since I always got marks that never exceeded 10. The teacher kept on humiliating me in front of my classmates, and my friends were not a great help either. As a result, I almost hurt myself on purpose. So basically, whenever I am studying Mathematics or about to get marks for my test, I am reminded of the bad memories.”</i>
Lack of Exercise	27	<i>“I need to do a lot of exercises to be able to pass this subject. I need to get familiar with the types of questions because final examination questions are quite confusing and involve too many formulas.”</i>
	8	<i>“I notice that if I’m not doing plenty of exercises in MAT183, I always forget the steps and formula involved to solve the problem.”</i>

Educational Background of Students

The above information gives some views of the students, which related to their educational background. Based on the students’ feedback, the majority of them agreed that having a poor grade in Mathematics and Additional Mathematics subjects is one of the factors that causes the failure rate in MAT183. In Malaysia, Mathematics is a compulsory subject that should be taken by students, while Additional Mathematics is one of the elective subjects for Science stream students. This factor is also supported by Hasan et al. (2018), who claimed students weak in Mathematics would find difficulty in learning Mathematics at the university level, and therefore, indirectly producing graduates who are afraid of numbers. To perform well in Mathematics, students should be excellent in problem-solving, derivation, and analysis. Also, Ayang and Tee (2019), believed that students with poor grades in Mathematics would face difficulty at university even when they are dealing with easy topics on the subject. This can be supported by the results of their study that showed students who scored poorly in Additional Mathematics or did not take the subject at all also performed poorly in the first year of examinations. Thus, it is clear that the lack of basic knowledge in Mathematics and Additional Mathematics is one of the predictors which strongly affects the students’ ability in performing well in Mathematics.

Fear of Mathematics

Michael (2015) summarized that students fear Mathematics to the extent that they believed they would fail even though they had practiced this subject. In addition, students’ motivation for this subject was also reduced because of the beliefs of non-Mathematics educators who believed Mathematics is a difficult subject. The views of the students on fear of Mathematics were mentioned earlier. Based on the responses given, it showed that students’ fear of Mathematics might come from psychological incidences. Nevertheless, fear of Mathematics makes students unable to gain knowledge in this subject (Jameel & Ali, 2016). They strongly suggested that there is a need to bring interest and positive attitudes towards Mathematics, as students who enjoy the learning process, will feel satisfied with the knowledge that they have achieved. Based on the previous studies, it is confirmed that anxiety towards Mathematics will also contribute to the failure of Mathematics because many people agreed that the learning concepts in science and Mathematics fields are difficult to perceive and quite abstract.

Lack of Exercise

Some students mentioned that lack of exercise or homework in MAT183 can also contribute to the failure rate. This may be because of the attitude of the students themselves. A study by Rameli and Kosnin (2016) revealed that the majority of students feel lazy to do exercise when facing difficulty in Mathematics. This statement is also supported by the same study that found out a few of students were influenced by their peers not to do the Mathematics exercise. Furthermore, the poor performance in Mathematics may be caused by a lack of effort from the students. This argument has been discussed by Tachie and Chireshe (2013) who found out that students are lazy, students are unable to answer past questions regarding Mathematics because they do not revise at school or home. Most importantly the students do not put any effort into this subject simply because Mathematics is difficult for them. In MAT183, calculation is one of the important steps in each subtopic. If students keep doing all of the exercise and homework, they can likely solve every questions in their examination, and as a result, increase their confidence level in Mathematics.

Conclusion

The result indicated that the factors contributing to the failure rate in MAT183 come from internal factors. These factors can be controlled by the students themselves. Thus, this problem can be overcome with the help of lecturers. To improve the performance of the students, lecturers need to closely monitor the students who are weak and perform poorly in this subject from the beginning of the semester. In addition, lecturers need to be able to identify the topics the students fear the most and do intensive exercises on them. Meanwhile, students need to change their way of study or learning skills in MAT183 because the problem is their understanding of the fundamentals or basics of Mathematics. This subject is quite different from other theoretical subjects such as Physics and History, which require students to remember the information. Besides that, it is encouraged that teaching is done with the aid of technology to attract students' interest, for instance, the application of games and creative videos. This is because young students these days are drawn to the most interesting things. It is also believed that lecturers and students need to be in a good and respectful relationship to have a positive environment in the classroom. Although only the qualitative technique is used in this study, the results indicated the common factors that have been discussed the most during the quantitative research study. Thus, qualitative technique is also a powerful approach to deliver the information needed by the researchers since the focus is on the problems of the study.

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Conflict of interests

Authors hereby declare that there is no conflict of interests with any of organization in this study.

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