

## What Makes Mathematics Difficult as a Subject for most Students in Higher Education?

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### Abstract:

One of the greatest challenges of a teacher is making mathematics easy for the students. Since mathematics subject in Higher Education is of a higher level than those introduced in the secondary and elementary levels, more and more students tend to find the most difficulty with it in higher education. With this, from the perspective of the students, this study aims to identify the root causes of mathematics difficulty whilst identifying possible solutions to this problem based on what students experienced. The utilization of qualitative research design was employed using open-ended questions on a survey to probe students' narrative responses. The categorization of information generates themes and patterns from 263 students of Higher Education institutions. As organized, it resulted in three basic categories such as Delivery of Instruction by the teacher; Learners' Ability and Experiences; and School Environment and Facilities. With this, it is concluded that there are only three things that make mathematics difficult for students namely: teachers, students themselves, and the environment that limits their interaction. One or more of these three factors when left unnoticed might as well lead to the waste of most students' potentials.

**Key Words:** Higher Education Mathematics, Mathematics Difficulty, Themes, and Categorization, Davao Oriental Philippines

### Introduction

Though having a lot of researches which aims to solve students' difficulty in Mathematics, ideas and perspective always differ on students' different exposures as it is affected by different factors, this is a way of advancing ideas relating to this particular problem (Lupadag, 2010). Because even with all the efforts, learning Mathematics has been difficult all through the years for students and has been a difficult task to deliver for the teachers. Since Mathematics subject is a subject with utmost relevance that influence multiple decisions in life (Little, 2009), as stated in one of the principles established by the National Council of Teachers of Mathematics (NCTM, 2000), "excellence in Mathematics education requires equity-high expectation and strong support from the students". Fully considering this, this study aims to identify the causes of higher education students' difficulty in learning Mathematics.'

This research focused its discussion on the causes of the students' difficulty in learning Mathematics in higher education fully considering the perspective of the students based on their personal experiences. With this, the depths of students' thoughts about the causes of their personal difficulty were explored.

**Objective/s:** This study aims to identify the causes of higher education students' difficulty in learning Mathematics.

## Review of Literature

Mathematics subject has been dreaded by most students and this is observable in the class where teachers experience the saddest reality in which the subject is deemed to be difficult for most students. As a result of the efforts to solve this problem, directly or indirectly, emerging researches has made its way to identify causes of this difficulty. In a research entitled "College Students' Difficulties with Basic Mathematics" by Arenillo and Cruzado (2014), the subject Mathematics itself evokes fear and anxiety to college students. Also, this difficulty experienced by,most students are not just spoken in order to be heard but evidences on performance of students in Mathematics along with other disciplines are lower across various class sizes (Arenillo & Arenillo, 2013). This indicates that Mathematics indeed is not an easy subject for the students. A lot of researches emerge in order to address this problem. In a research conducted by Hua Liu (2011) where "relation among adolescents' perceptions of their mathematics classroom learning environment, attitudes to Mathematics, metacognition in Mathematics learning as defined by their preparation for future learning" research finding is stated that adolescents' metacognition in Mathematics learning had the largest relationship with adolescents preparation for future learning. With this, many ways has been tried and different factors are identified in order to address the issue. The teachers in the classroom resorted to many strategies and techniques. In the Philippines, many instruments were created to better understand and have a grasp of the problem, one of these were for Filipino students in order to investigate students' attitude towards Mathematics (Talens, 2013).

## Methodology

This study utilized qualitative research design was employed using open-ended questions on a survey to probe students' narrative responses. Narrative data was gathered from two hundred sixty three (263) college students from Davao Oriental State College of Science and Technology-Cateel Extension Campus which are identified through stratified random sampling technique. Higher education students who were enrolled and or currently enrolled in Mathematics subject regardless of their year level is the criteria for including the participants. Participants from Bachelor in Agricultural Technology was thirty seven (37); Bachelor of Elementary Education was forty four (44); Bachelor of Science in Agribusiness Management was thirty three (33); Bachelor of Science in Business Administration major in Financial Management was ninety nine

(99); Bachelor of Science in Criminology was twenty four (24); and Bachelor of Secondary Education Major in Biological Sciences twenty six (26).

Ethics in collecting data involves the administration of informed consent and the explanation of the confidentiality issues. As participants willingly participated the survey, survey questionnaire in an open-ended questions were administered to probe students' responses. The first question, "What do you think is the reason why Mathematics in general is difficult for you to understand and learn?" This is given in order to track the root causes of the problem. The second question, "What makes a particular topic in Mathematics easy for to understand the moment it was introduced despite previously anticipating it as difficult?" This two contrasting questions has both aims in identifying the cause of students' difficulty and the other is to get solutions for the problem from the students themselves as they have experienced. Students' responses were categorized into themes as it revolves a common themes and commonly relative experiences. Categorization of information was thoroughly done after focusing on what to analyse. Carefully, patterns and themes were identified organizing them to coherent categories.

## Findings

Based on thorough analysis, the responses lead this research to arrive in to three major themes and their core ideas. The causes of the difficulty according to the students are the delivery of instruction by the teachers themselves, learners' ability and experiences, and the last one, the school environment and facilities. The three main themes are sub-categorized according to students' responses which generates core ideas. Delivery of instruction has three core ideas generated, exposure to mathematics, past experiences with mathematics as a subject, and mathematical inclination or the students' preference. And lastly, the school environment and facilities has three sub-categories, identified as: class atmosphere, classroom physical environment, and school facilities.

Table: 1

Major themes and core ideas on what makes Mathematics difficult as perceived and experienced by the students

Major Themes	Core Ideas
Delivery of Instruction by the Teacher/Instructor	-Teacher's sensitivity -Pace in Teaching -Strategies and Methods used by the teacher/instructor
Learners' Ability and Experiences	-Exposure to Mathematics -Past experiences with Mathematics as a subject -Mathematical inclination (student preference)
School Environment and Facilities	-Class atmosphere -Classroom physical environment -School facilities

## Delivery of Instruction by the Teacher/Instructor

It is not mathematics subject that students hate but the teacher who delivers the instruction (Simmers, 2011). The delivery of instruction by the teacher is one of the categories that were given emphasis on students' responses.

*I sometimes love mathematics, depending on how the teacher explained and discussed the concept to us. It is how the teacher teaches me that makes me feel assured whether I can learn Mathematics without the fear that I won't make it. (S02)*

The students experiencing the difficulty tend to associate the causes to the teachers, mentioning about the pace in teaching, strategies and methods used by the teacher and the teachers' sensitivity. Although somehow these three are interconnected, the students wanted to emphasize that for them, the teachers teaching Mathematics tend to be faster than it is supposed to be. And the teachers' choice of the strategies and methods used by the teacher/instructor are sometimes not fit to the student's capabilities. The choice for the right teaching strategy and how this teaching strategy is being established, according to Loren (2012) it is important to attain good teaching performance. This is where it is undeniable that, crucial to teaching is the teacher's sensitivity to the students' need. Humans are not robotic creatures that simply comply with going to class and tell or show students something they should hear because it is written in the curriculum but rather they are beings that create a network of intangible connections formed through sensitivity in which a teacher must possess. For the students, a teacher that has the ability to connect and sensitive to that connection can easily respond to their needs. The college faculty played major and significant roles in the teaching learning process and greatly influence students transformation from less to a better individual (Ramos, 2010)

## Learners' Ability and Experience

Exposure to Mathematics; past experiences with Mathematics as a subject; and Mathematical inclination (student preference) comprises the learners ability and experience. There are students who admitted that based on their self-assessment, they are not mathematically inclined and as much as they do, if not needed in the curriculum, they would not dare enrol the subject. But there are those who said that even personally admitting that they are not mathematically inclined, they still have that experience where they found Mathematics particularly easy compared to other subjects if they would just listen and give it a focus. They said that the ability to learn Mathematics actually lie with the students' willingness to learn and accept the challenge. It is their past experience with their Mathematics subject that actually gives them the prejudice of judging the subject before they were able to have it a try.

These experiences do not only include being embarrassed inside the class due to wrong answer or for thinking that they have understood the concept and when the quiz came they got a zero score or even doing their best to focus and listen and still in the end despite the effort, they

haven't gotten any better than before and only resort to believe that Mathematics is indeed difficult and not for them to learn. These experiences had greatly contributed in causing the difficulty experienced by most students in higher education.

*I really am not good at Math, I keep on doing my best but it is just that Math is not for me. Sometimes I thought I already understood, but things become different when I am working on my own. (SO10)*

While exposure to Mathematics can somehow summarize students' past experiences with Mathematics as a subject and their mathematical inclination, whether or not they are mathematically inclined they also said that maybe from the very beginning if they have nurtured their sense for mathematics, maybe they could have been a little better. Their first impression about it the first time they experienced their difficulty continued and now that they realized that it has been the thought that it is difficult that is being nurtured and is what they are being exposed at.

### **School Environment and Facilities**

School environment plays a significant role in students' learning. Class atmosphere is what is being created by the teacher, students said that they tend to feel that the subject is difficult based on the teacher's aura inside the class. They tend to judge the subject as difficult when the teacher tends to be strict. The fear to clarify and ask questions when confusions arise are the factors that affect their decision to agree and pretend to understand. The unfriendly environment created inside the class tends to disturb students while learning. But this is not just the scenario they are considering because they also experienced an atmosphere that is so friendly that they only take the subject for granted and in the end has earned a little too weak of the necessary foundations.

The atmosphere that is intangibly created are only felt tend to disturb the students emotionally that caused them the difficulty in learning Mathematics. While this is so, the physical environment for them if not managed carefully tends to add up to the existing causes.

The physical classroom environment affects the students' focus when things such as ventilation, lighting, time schedule, etc. become a concern for them. Time schedule, when it can't be avoided to fall on times students would easily fall asleep. This is the time where the students are really experiencing the difficult times. While school facilities for them can be narrowed down to the availability of materials and physical facility where they can reinforce their learning in Mathematics they also take this as the cause of their difficulty. When materials are already difficult to understand with its limited content and when their time limits their occupancy at the library and their concern for their other subjects.

## Conclusion

This study leads to the conclusion that though there are a lot more underlying reasons that causes the students' difficulty in learning Mathematics, there are three most evident emerging themes that summarizes the causes of this difficulty are delivery of instruction by the teacher/instructor; learners' ability and experiences; and school environment and facilities. The teachers in Mathematics have the key role in making it difficult or easy for the students. With the guidance of the teacher, students' hatred for Mathematics can be determined to continue, get worst or this hatred can be reversed and turned out to be loved for Mathematics. The thin lines that link all other causes to the teacher as the key holder of most students' reaction, the link of the teacher to every cause directly in instruction, student experiences, and the environment can be confirmed and can be experienced though classroom observations for research studies.

## Suggestions and Recommendations

It is recommended that with the emerging causes of mathematics difficulty can be used in improving teacher training for mathematics teachers. Also, the results can be used as future reference in planning strategies in delivering mathematics instruction in higher education.

## References

- ARENILLO , S. A. & Arenillo , M. T.. (2013). Academic Dimensions of Student Performance across Class Size. *IAMURE International Journal of Education*, 7(1). Retrieved from <http://ejournals.ph/form/cite.php?id=3266>
- ARENILLO , S. A. & Cruzado, S. M.. (2014). College Student's Difficulties with Basic Mathematics. *IAMURE International Journal of Multidisciplinary Research*, 8(1). Retrieved from <http://ejournals.ph/form/cite.php?id=2623>
- Crudo-Capili, M. . (2010). Phenomenology of Mathematics Teaching. *The Trinitian Researcher*, 3(1). Retrieved from <http://ejournals.ph/form/cite.php?id=103>
- GEMPES, G. P., Serrano , R. , Miranda, M. & Detoya, G. . (2010). Faculty and Student Feedback on the Quality of Teaching: A Monitoring Stratagem. *UM Research Journal*, 7(1). Retrieved from <http://ejournals.ph/form/cite.php?id=2070>
- Hua Liu , C. . (2011). School environments, attitudes, metacognition, and Chinese students' transfer of learning. *The Asian Journal of Educational Research and Synergy*, 3(2). Retrieved from <http://ejournals.ph/form/cite.php?id=1280>
- Loren, M. S.. (2012). [MATH]A Meta – Analysis of Experimental Research Studies on Mathematics Teaching. *IAMURE International Journal of Mathematics, Engineering and Technology*, 3(1). Retrieved from <http://ejournals.ph/form/cite.php?id=2778>
- Quintillan-Bugas, R. . (2010). Predictors of English, Mathematics, and Science

- Achievement. *LEAPS: Miriam College Faculty Research Journal*, 33(1). Retrieved from <http://ejournals.ph/form/cite.php?id=3500>
- Ramos, E. W.. (2010). Performance Ratings of College Faculty and Academic Performance of College Freshman Students. *The Trinitian Researcher*, 3(1). Retrieved from <http://ejournals.ph/form/cite.php?id=102>
- Simmers, M. J. (2011). It's Not Mathematics They Hate. Hawaii International University International Conference on Mathematics and Engineering.
- TALENS, J. D. & Guce , I. . (2013). Scale on Attitude Toward Mathematics (SATM). *Educational Measurement and Evaluation Review*, 4(1). Retrieved from <http://ejournals.ph/form/cite.php?id=6539>