The Anxiety Equation: Decoding Students' Anxiety Levels and Building Resilience in Learning Mathematics Courses

Michael Angelo A. Legarde

Palawan State University – Graduate School, Puerto Princesa City, Palawan, Philippines
malegarde@psu.palawan.edu.ph

Abstract: This quantitative study determines the anxiety levels of students when learning mathematics courses. This study also explored the different strategies employed by the students to cope with the challenges and adversities they encountered while attending mathematics classes. The quantitative analysis revolved around the 200 freshmen students at a state university in the Philippines. The data were gathered through a set of adapted questionnaires, and descriptive measures such as frequency, percentage, and means were used in analyzing the data gathered. The result of the study shows that severe and moderate levels of anxiety are mostly experienced by the respondents. Furthermore, the frequent learning strategies they have used to cope with the anxiety are the following: practice solving problems when they have time, discuss their difficulty in math with their classmates, and meet with a study partner outside the class to work on homework or prepare for a quiz, or during class review, clarify, solve problems, or encourage one another. Based on the findings, the researcher recommends that there is a need to recognize the level of anxiety they are experiencing for them to be able to know the appropriate strategy to overcome it. Also, mathematics educators should consider innovative and interactive teaching strategies to make students' mathematics learning enjoyable and fun.

Keywords—Anxiety Levels, Coping Strategies, Adversities, Mathematics Courses

1. INTRODUCTION

Mathematics has been a part of one's academic path since the first day of school. We tend to believe that mathematics is simply about numbers, but we utilize it instinctively in our daily lives such as asking for the time, our heartbeats, budgeting, and even rudimentary arithmetic and children's first attempts at counting. Though not all pupils are interested in the subject, everyone has access to it because it is part of the curriculum. Mathematics is a vital topic. Its value extends to all aspects of life, including economics, science, computer processing, engineering, and music. It is, nevertheless, odd that something so important is loathed and feared by so many pupils. According to Fritz et al. (2019), mathematics has become the most despised topic ever since many students find it difficult. As a result, most college students regard mathematics and courses related to it as something they should avoid. As a result, in order to avoid having to take those classes, students tend to choose a field of specification/degree that does not entail mathematics, not realizing that regardless of their course, they must still take mathematics courses. According to Yeping et al. (2019), mathematics is essential in many fields, particularly science, technology, and engineering. As a consequence, understanding it later causes individuals to feel worried, fearful, and uneasy, which usually leads to continual tension and worsens that sensation over time.

Ending up concerned, fearful, and uneasy about mathematics, whether on a daily basis or in academic contexts, tends to drive people away from becoming stuck/mentally blocked when they hear anything involving it. Aside from anxiety, which lowers their performance, students avoid subjects involving mathematics because some students believe that learning mathematics is a difficult task for them, and this belief results in a "hatred" of the subject, as Rius (2015) has stated. As a result, students may isolate themselves from the topic or devote more time to leisure activities than to mathematics tasks. Many symptoms have been identified as indicators of mathematics anxiety. According to Villamizar et al., (2020), "mathematics anxiety" refers to feelings of tension and worry that interfere with number manipulation and problem solving in a wide range of everyday and academic contexts.

Anxiety was caused by the student's personality in addition to environmental elements such as myths, teachers, and parents. Furthermore, Rattan et al (2012) stated that it is natural for everyone to struggle with math. With this perspective, many students give up on learning numbers, despite the fact that they are crucial in our daily lives and for future usage. When students confront mathematics-related courses in college, they develop anxiety because they are terrified of failing. According to Moriah et al. (2017), persons who experience math anxiety believe they are lousy at arithmetic and, consequently, dislike the subject. On the other hand, students who struggle with mathematics have their plans for passing the course.

Furthermore, Ramirez et al. (2018) found that mathematics anxiety is a ubiquitous issue in education that requires specific attention from educators and researchers in order for students to realize their full academic potential. Individuals who suffer mathematics anxiety on a regular basis are more inclined to shun mathematics subjects, courses, and occupations. Consequently, mathematics anxiety is a concern for both short-term learning because it impairs performance and long-term learning because it steers students away from mathematics opportunities and career paths (Buckley, Reid,

Good, Lipp, & Thomson, 2016). Having a learning approach is essential because it will be of tremendous assistance to an individual. Woodard (2004) found that using manipulatives, graphing calculators, and computers provides students with diverse learning styles with alternate strategies for learning new topics. She further stresses that stereotypes like math aptitude being inherited and math being a male area are just false. The academic style of students and teachers, as well as their learning and teaching styles, change throughout time; nonetheless, mathematics anxiety persists.

Every student has an inbuilt learning strategy, and just as we all have different learning styles, we all have different reasons for doing our learning tactics. According to Hong Shi (2017), the more techniques a learner employs, the more confident, driven, and self-efficacious the learner feels. Adopting strategies aims to "affect the learner's motivational or affective state or the way the learner selects, acquires, organizes, or integrates new knowledge" (Hong Shi 2017). He added that strategies are especially important for language learning because they are tools for active, self-directed engagement, which is essential for developing communicative competence. Thinking along these arguments, the researcher's aim to unravel students' anxiety level and coping strategies in learning mathematics courses becomes the impetus for this study.

2. METHODOLOGY

Quantitative research design was employed to determine the anxiety level and learning strategies of the students in learning mathematics courses. According to Gay (1992), this research design involves collecting data in order to test hypotheses or answer questions concerning status of the subject of the study. Specifically, this study utilized descriptive approach.

Descriptive research determines and reports the current state of circumstances. Furthermore, descriptive study is scientific research that describes occurrences, phenomena, or facts in a methodical manner pertaining to a certain location or population. As a result, this design was chosen because the researcher wanted to gather data that explains the features of the respondents in a given phenomenon and their response to it using standardized collection techniques and a structured research instrument.

Furthermore, the researcher adapted the questionnaire developed by May (2009) and Sutter (2006). The questionnaire was broken into three sections. The first section details the respondents' demographic characteristics. It offers optional variables such as name, age, gender, and major. The second segment assessed students' anxiety levels as they studied mathematics. It consisted of anxiety situations that the students encountered while taking mathematics classes, and the respondents' responses were divided into four categories of anxiety, which are 4 - Panic, 3 - Severe, 2 - Moderate, and 1 - Mild. Finally, the third section includes ways that students can

utilize to master Mathematics in the Modern World. It is a checklist-style questionnaire in which respondents select the appropriate box if they never, seldom, occasionally, frequently, or always use the approach when learning the specified course. The researcher believed that by employing a survey questionnaire, they might obtain the necessary information to complete this study successfully.

Moreover, the respondents included in this study were the 200 freshmen students in a state university in the Philippines. These respondents were obtained through stratified sampling technique.

To answer the research questions, descriptive measures such as mean and standard deviations were employed to examine the anxiety levels of the respondents towards mathematics courses as well as their coping strategies amidst the challenges and adversities, they are facing in learning mathematics.

3. RESULTS AND DISCUSSIONS

Respondents' Level of Anxiety

This section illustrates the level of anxiety of the respondents as they attended mathematics courses. As mentioned in the previous part of this paper, this study used four levels of anxiety namely: mild, moderate, severe, and panic. Furthermore, descriptive measures were employed to describe the respondents' anxiety levels.

Table 1. Level of Anxiety of the Respondents

Statement	*Mean Rating*	*Qualitative Description*
1. *Think of trying to solve hard math problems.*	2.82	Severe Level
2. *Get a low grade in mathematics.*	2.78	Severe Level
3. *Taking the examination of a mathematics subject.*	2.71	Severe Level
4. *Being called to recite about concept in mathematics.*	2.69	Severe Level
5. *See that one or two mathematics subject are included in his subject to be taken.*	2.61	Severe Level
6. *Called by the teacher to solve problem in front of the class.*	2.58	Severe Level
7. *Ask to solve problem in front of the class.*	2.57	Severe Level
8. *Preparing for a mathematics examination.*	2.56	Severe Level

Statement	Mean Rating	Qualitative Description
9. Use mathematics in future career.	2.27	Moderate Level
10. Asking question in the class.	2.21	Moderate Level
11. Understanding the content in a mathematics course.	2.1	Moderate Level
12. Doing a mathematics homework.	2.09	Moderate Level
13. Listening to mathematics instructors in class.	1.84	Moderate Level

Legend: 1.00-1.74 = Mild level, 1.75-2.49 = Moderate Level, 2.5-3.24 = Severe Level, 3.25-3.99 = Panic Level

Table 1 presents the anxiety levels of the respondents while taking mathematics courses. From the thirteen situations given to the respondents, eight of them were found to be significantly contributed to their anxiety as indicated by their mean ratings. The analysis revealed that the statement "*Think of trying to solve hard math problems*" obtained the highest mean rating of 2.82, indicates that the respondents have severe level of anxiety in solving difficult mathematics problem.

On the similar vein, this data was followed by the statement "*Get a low grade in mathematics*" which stresses that the respondents have severe anxiety on the idea that they might get low grades in their mathematics courses. Similarly, the mean rating of 2.71 indicates that they also have severe level of anxiety on the statement "*Taking the examination of a mathematics subject*".

According to the findings, respondents' anxiety levels while taking mathematics courses are severe and moderate, with the majority of students experiencing severe anxiety. Since most of the respondents are facing the 2nd highest level of anxiety, thus they possibly experiencing pounding heartbeat, chest pain, head ache, vomiting and diarrhea, trembling scattered thoughts, and erratic behavior while taking the course. However, the findings contradict to the investigation of Delgado and Kassim (2019) which they stated that young Filipino learners identify themselves to be in the moderate level of anxiety while taking mathematics courses.

Learning Strategies Used by the Respondents to Cope-up from Mathematics Anxiety

This section depicts the strategies used by the respondents to cope with the challenges and adversities they encountered in learning mathematics. Furthermore, descriptive measures were also employed to describe the respondents' coping strategies.

Table 2. Learning Strategies Used by the Respondents to Cope-up from Mathematics Anxiety

Coping Strategies	Mean Rating	Qualitative Description
1. Practice solving problems when have time.	3.37	Always
2. Discuss your difficulty in your math course with your classmates.	3.33	Always
3. Meeting with a study partner outside the class to work on homework or prepare for a quiz, or during class review, clarify, solve problems, or encourage one another	3.30	Always
4. Post notes about the course in some area in your room where you can easily see it and be reminded.	3.29	Always
5. Reward yourself for any achievement or development you got while doing mathematics task or assessments.	3.21	Often
6. Reminding yourself that you are mentally capable even when you start to feel incompetent.	3.20	Often
7. Discuss with the instructor my math course difficulty	3.18	Often
8. Set personal goals for yourself.	3.15	Often
9. Ask your instructor math question in class	3.12	Often
10. Recite it in front of the mirror as if you are practicing for a recitation.	3.08	Often
11. Engage yourself in active processing and self-monitoring.	2.89	Sometimes
12. Listening to slow-tempo music immediately prior to or during mathematics performance situations.	2.53	Often
13. Writing important concept on the separate paper while reviewing.	2.43	Sometimes
14. Meeting in person or conversing through phone or email with your instructor for help on material you don't understand.	2.28	Sometimes
15. Use a private tutor	1.80	Sometimes

Legend: 1.00-1.74 = Never, 1.75-2.49 = Sometimes, 2.5-3.24 = Often, 3.25-4.00 = Always

As presented by Table 2, among the fifteen coping strategies identified, four of them always used by the respondents as described by their mean ratings. The first statement *"Practice solving problems when have time"* have the highest mean of 3.37 which reflects that the respondents find time in solving mathematical problems to further understand mathematical concepts.

This was followed by the statement "Discuss your difficulty in your math course with your classmates" with mean rating of 3.33. This clearly implies that the respondents always consulted with their classmates some of their misconceptions as well as difficulties in mathematical concepts taught by their mathematics teachers. This statement was also validated when the analysis pointed out that the respondents always used the statement *"Meeting with a study partner outside the class to work on homework or prepare for a* quiz*, or during class review, clarify, solve problems, or encourage one another".* This indicates that the role of peers plays a significant role to the mathematics performance of the respondents. Also, the mean rating of 3.29 pointed out that the respondents always used the strategy *"Post notes about the course in some area in your room where you can easily see it and be reminded".*

Overall results show that to cope with the anxiety during and after the class, the respondents always do activities alone like practice solving, writing notes for reviewing and self- motivation. On the other half, activities where they are going to blend with other students, or their professor is rarely do. Among all the coping strategies having a private tutor is the highest pick of the student under the option "never" which implies that students are effectively coping ith anxiety while doing the task and activity by themselves. This finding contradicts to the previous study of Sutter (2006) which states that low math anxiety participants indicated the most helpful strategies were working with a group in class and a partner outside of class, having a partner in class, and reminding oneself of being mentally capable.

4. CONCLUSIONS AND RECOMMENDATIONS

The result of the study showed that the anxiety level of the students is severe which leads the researcher to conclude that they have experienced inability to focus and their ability to solve problems is impaired, which can also lead to further anxiety. The biggest chunk of the students claimed that (1) Think of trying to solve hard math problems, (2) Get a low grade in mathematics, (3) Assign to be a leader in a mathematics task, (4) Taking the examination of a mathematics subject, (5) Receive the result of the examination, are the situations that triggers the anxiety they feel while they are taking the course. Additionally, they have their methods to cope up with those experiences, the most frequent methods they have used are (1) writing important concept on the separate paper while reviewing; (2) set personal goals for yourself; and (3) reward yourself for any achievement or development you got while doing mathematics task or assessments.

As for the learning strategies of each major, the result shows that the effective coping strategies of the students are almost the same. Whereas the top 5 strategies of every group revolve on the learning style; reading and writing, cooperative learning, and person-centered approaches such as; self-motivation, self-appreciation, and setting goals.

In the light of the findings of this study, the following recommendations are made:

1. Students should recognize the level of anxiety you are experiencing for them to be able to know the appropriate strategy to overcome it.

2. Mathematics students should avoid overthinking or feeding their minds with negative thoughts to prevent worsening the anxiety they are dealing with.

3. Students are encouraged to identify their learning traits to be able to discover effective learning strategies to cope up while learning any mathematics related subjects or courses.

4. Teachers should consider innovative and interactive methods; learning style such as reading and writing, cooperative learning, and person-centered approaches to be able to manage learning despite having anxiety.

5. For future researchers consider factors other than mathematics anxiety that might contribute to acquisition of any mental health condition of the students such as; teachers' factor, environmental factor, behavior, financial, etc.

5. REFERENCES

[1] Annette Brown (2017). What Are the Different Levels of Anxiety? Retrieved from https://www.hhs.gov/answers/mental-health-and-substance-abuse/what-are-the-five-major-types-of-anxiety-disorders/index.html

[2] Anxiety Disorders and Anxiety Attacks (2020). Helpguideorg International. Retrieved February 02, 2021, from https://www.helpguide.org/articles/anxiety/anxiety-disorders-and-anxiety-attacks.htm

[3] Anxiety Disorders, (2018, July). National Institute of Mental Health. Retrieved February 02, 2021, from https://www.nimh.nih.gov/health/topics/anxiety-disorders

[4] Anxiety Disorders and Panic Attacks (2021). University Health Service of Michigan

[5] Retrieved January 04, 2021, from https://uhs.umich.edu/anxietypanic

[6] Anxiety in college: What we know and how to cope (2019, May 28). Harvard Health Publishing. Retrieved January 05, 2021, from

https://www.health.harvard.edu/blog/anxiety-in-college-what-we-know-and-how-to-cope-2019052816729

[7] Ballado R. (2014). MATHEMATICS ANXIETY AND ACADEMIC ACHIEVEMENT OF JUNIOR PRE-SERVICE TEACHER EDUCATION STUDENTS. Retrieved from https://www.westeastinstitute.com/wp-content/uploads/2014/06/RONATO-S.-BALLADO.pdf

[8] Buckley, S., Reid, K., Goos, M., Lipp, O. V., & Thomson, S. (2016). Understanding and addressing mathematics anxiety using perspectives from education, psychology and neuroscience. Australian Journal of Education, 60(2), 157–170. https://doi.org/10.1177/0004944116653000

[9] Center for Collegiate Mental Health 2017 Annual Report (2019). Daily Life. Retrieved from https://www.stress.org/anxiety-in-college-students-causes-statistics-how-universities-can-help

[10] Commission on Higher Education (CHED) Memorandum (CMO) No. 20, series of 2013 proposed New General Education Curriculum (GEC)

[11] Delgado K. D. and Kassim S. (2019). MATHEMATICS ANXIETY AMONG YOUNG FILIPINO LEARNERS: INVESTIGATING THE INFLUENCE OF GENDER AND SOCIO-ECONOMIC STATUS. Sci.Int. (Lahore), 31(3),575-579, 2019 ISSN 1013-5316;CODEN: SINTE 8

[12] Different Levels of Anxiety (2021, August 05). The Recovery Village. Retrieved from https://www.therecoveryvillage.com/mental-health/anxiety/related/levels-of-anxiety/

[13] Fall 2018 National College Health Assessment (2018, November 08). American College Health Association. Retrieved February 5, 2021, from https://www.acha.org/documents/ncha/ncha-ii_fall_2018_undergraduate_reference_group_data_report.pdf

[14] Fritz, A., Haase, V. G., & Räsänen, P. (2019). International Handbook of Mathematical Learning Difficulties. Springer.

[15] Gay L.R., (1992). A Brief Study on Descriptive Research: Its Nature and Application in Social Science. Retrieved from https://www.iarj.in/index.php/ijrah/article/view/38

[16] Gerardo Ramirez, Stacy T. Shaw & Erin A. Maloney (2018). Math Anxiety: Past Research, Promising Interventions, and a New Interpretation Framework, Educational Psychologist, 53:3, 145-164, DOI: 10.1080/00461520.2018.1447384

[17] Gulnaz, M. and Fatima, R. (2019). A Study of Finding the Reasons of not Choosing Mathematics at Senior Secondary Level by Girls in Nawada District of Bihar. Pedagogical Research, 4(4), em0043. https://doi.org/10.29333/pr/5899

[18] Hong Shi (2017), Learning Strategies and Classification in Education. Retrieved from http://www.auburn.edu/academic/cla/ilsrj/Journal%20Volumes/Fall%202017%20Vol%201%20PDFs/Learning%20Strategies%20Hong%20Shi.pdf

[19] King, J., (2012). Asked students to help each other understand ideas or concepts. Retrieved from https://www.ideaedu.org/idea-notes-on-instruction/asked-students-to-help-each-other-understand-ideas-or-concepts/

[20] Kurukkan A., & Gafoor K.A., (2015, August 18-19). Why High School Students Feel Mathematics Difficult?An Exploration of Affective Beliefs. Pedagogy of Teacher Education Trends and Challenges. https://doi.org/10.13140/RG.2.2.18880.12800

[21] Li, Y., Schoenfeld, A.H. Problematizing teaching and learning mathematics as "given" in STEM education. IJ STEM Ed 6, 44 (2019). https://doi.org/10.1186/s40594-019-0197-9

[22] Magen-Nagar, N. (2016). The effects of learning strategies on mathematical literacy: A comparison between lower and higher achieving countries. International Journal of Research in Education and Science (IJRES), 2(2), 306-321.

[23] Math Anxiety and Math Performance (2017, April 05). Psychological Science. Retrieved from https://www.philippinesbasiceducation.us/2017/04/math-anxiety-and-math-performance.html

[24] May, D. K., 2009. MATHEMATICS SELF-EFFICACY AND ANXIETY QUESTIONNAIRE. Retrieved from https://getd.libs.uga.edu/pdfs/may_diana_k_200908_phd.pdf

[25] Mustafa Çalık (2020). Determining The Anxiety And Anxiety Levels Of University Students In The COVID 19 Outbreak.: University Students in the COVID 19 Outbreak. Retrieved from https://www.researchgate.net/publication/343389585_Determining_The_Anxiety_And_Anxiety_Levels_Of_University_Students_In_The_COVID_19_Outbreak_University_Students_in_the_COVID_19_Outbreak

[26] Panadero E., (2017 April 28). A Review of Self-regulated Learning: Six Models and Four Directions for Research. Retrieved from https://doi.org/10.3389/fpsyg.2017.00422

[27] Paunesku, D., Walton, G. M., Romero, C., Smith, E. N., Yeager, D. S., & Dweck, C. S. (2015). Mind-set interventions are a scalable treatment for academic underachievement. Psychological science, 26(6), 784–793. https://doi.org/10.1177/0956797615571017

[28] Rattan, A., Good, C., & Dweck, C. S. (2012). "It's ok – Not everyone can be good at math": Instructors with an entity theory comfort (and demotivate) students. Journal of Experimental Social Psychology. https://doi.org/10.1016/j.jesp.2011.12.012.

[29] Remo, L., (2019, April, 04). Prediction and Assessment of Students' Performance In Mathematics In The Modern

World (MMW). Retrieved from INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH VOLUME 8, ISSUE 04, APRIL 2019 ISSN 2277-8616

[30] Rius, M. (2015, May 21). ¿Por qué muchos estudiantes odian las matemáticas? Vanguardia. Recovered from www.lavanguardia.com/vida/20150521/54431772174/e studiantes-odian-matematicas.html

[31] Rovers, S., Stalmeijer, R. E., van Merriënboer, J., Savelberg, H., & de Bruin, A. (2018). How and Why Do Students Use Learning Strategies? A Mixed Methods Study on Learning Strategies and Desirable Difficulties with Effective Strategy Users. Frontiers in psychology, 9, 2501. https://doi.org/10.3389/fpsyg.2018.02501

[32] Seunagal, G., (2021). Are There Different Levels of Anxiety? Retrieved from https://www.betterhelp.com/advice/editorial_team/gabri elle-seunagal/

[33] Skaalvik, E., (2017, May 11). Mathematics anxiety and coping strategies among middle school students;relations with students achievement goal orientation and level of performance. Soc Psychol Educ (2018) 21:709–723 https://doi.org/10.1007/s11218-018-9433-2

[34] Smith-Nelson, C. K., (2016). Practicing Positive Coping Strategies for Managing Math Anxiety In A Secondary Mathematics Classroom. Retrieved from Smith-Nelson, Courtney Kathleen, "Practicing Positive Coping Strategies For Managing Math Anxiety In A Secondary Mathematics Classroom" (2016). MSU Graduate Theses. 2977. https://bearworks.missouristate.edu/theses/2977

[35] Sokolowski, H. M., & Ansari, D., (2017, October 17). Who Is Afraid of Math? What Is Math Anxiety? And What Can You Do about It? Retrieved from https://kids.frontiersin.org/articles/10.3389/frym.2017.0 0057

[36] Sutter, C. M., (2006). The Anxiety Levels and Perceptions of Mathematics Learners from a Midwestern Technical College on Selected Classroom Climate Factors in Mitigating the Effects of Math Anxiety. Retrieved from https://www.coursehero.com/file/44642716/2006sutterc -1pdf/

[37] Teens and College Students | Anxiety and Depression Association of America, ADAA. (n.d.). Anxiety Disorders and Depression Research & Treatment | Anxiety and Depression Association of America, ADAA. Retrieved January 27, 2022, from https://adaa.org/find-help/by-demographics/teens-college-students

[38] Tween and teen health (2020). Mayo Clinic (2020). Retrieved from https://www.mayoclinic.org/healthy-lifestyle/tween-and-teen-health/in-depth/college-depression/art-20048327

[39] Trends in International Mathematics and Science Study (TIMS) (2019). International Mathematics and Science Study. Retrieved January 04, 2021, from https://nces.ed.gov/statprog/handbook/pdf/timss.pdf

[40] Villamizar, G., Arenas, T. Y., & Calderón W. (2020). Relationship between mathematical anxiety and academic performance in mathematics in high school students. P. M. Latinoamericana ISSN 1688-4094 ISSN online 1688-4221. Ciencias Psicológicas January-June 2020; 14(1): e-2174 doi: https://doi.org/10.22235/cp.v14i1.2174

[41] Vitasari, P., Wahab, M. N. A., Othman, A., & Awang, M. A., (2010). A Research for Identifying Study Anxiety Sources among University Students. Vol. 3, No. 2; May 2010. International Education Studies. https://www.ccsenet.org/ies

[42] Who Is Afraid of Math? What Is Math Anxiety? And What Can You Do about It? (2017, October 17) Frontiers for Young Mind. Retrieved from https://kids.frontiersin.org/articles/10.3389/frym.2017.0 0057

[43] Woodard, T., (2004), The Effects of Math Anxiety on Post-Secondary Developmental Students as Related to Achievement, Gender and Age. Inquiry, Volume 9, Number 1, Spring 2004. Retrieved from https://files.eric.ed.gov/fulltext/EJ876845.pdf

[44] Wu, Y.-J., Chen, Y.-H., Kiefer, S. M., & Carstensen, C. H. (2021). Learning Strategies as Moderators between Motivation and Mathematics Performance in East Asian Students: Latent Class Analysis. SAGE Open. https://doi.org/10.1177/21582440211061382

[45] Xin, Y. P. (2008). The Effect of Schema-Based Instruction in Solving Mathematics Word Problems: An Emphasis on Prealgebraic Conceptualization of Multiplicative Relations. Journal for Research in Mathematics Education, 39(5), 526–551. http://www.jstor.org/stable/40539313

[46] Yeping, L., & Schoenfeld, A., (2019, December 19). Problematizing teaching and learning mathematics as "given" in STEM education. Li and Schoenfeld International Journal of STEM Education (2019) 6:44. https://doi.org/10.1186/s40594-019-0197-9