

FACTORS AFFECTING STUDENTS' ACADEMIC PERFORMANCE IN MATHEMATICS IN THE NEW NORMAL

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ABSTRACT: *This study investigated factors pertaining to mathematics education as perceived by the students during the new normal learning. The study is all about factors affecting students' academic performance in Mathematics during the new normal. This study was conducted to: describe the demographic profile of the education students based on age, gender and economic status; assess the teachers' effectiveness as perceived by the students during new normal education; identify and evaluate the level of efficiency of instructional materials as perceived by the students during new normal education; and examine students' academic performance in mathematics in relation with their demographic profile and teachers' effectiveness. The research employed descriptive correlational statistics Pearson correlation and multiple regression treatments. It was conducted at Central Mindanao University, Maramag, Bukidnon to one hundred fifty (150) first-year students for the academic year 2021-2022. Results showed that participants had a varied demographic profiles. Teachers' effectiveness as perceived by the students is effective. The level of efficiency of instructional materials as perceived by the students is efficient. Moreover, students' academic performance and teachers' effectiveness, results indicated that the variable has a significant relationship and is positively correlated. Therefore, since the students' own socioeconomic status, concepts and ideas on the subject focused, and the instructional materials are such essential elements in the teaching and learning process, it is recommended to further research the factors and explore other aspects that may have an impact on students' academic performance when dealing with the course.*

Keywords: *academic performance, new normal, mathematics education, teaching effectiveness*

1. INTRODUCTION

The spread of the COVID-19 pandemic has posed a significant challenge to the educational systems [1] which affected nearly 1.6 billion students in more than 200 countries [2]. The students are falling behind due to the closure of schools in an attempt to contain the spread of COVID-19. Furthermore, to keep the children learning amidst the pandemic, different countries explored alternative methods of providing education by utilizing various technologies available such as the internet, television, and even radio [3] paving the way for introducing digital learning as the educational paradigm shifted to various online learning platforms [2].

Amid the pandemic, the Philippines' Department of Education launched consultations on the reopening of schools, polling almost 700,000 people. Guidelines for ensuring the safety of students were issued as part of the Inter-Agency Task Force (IATF) for the Management of Emerging Infectious Diseases Resolutions on the reopening of schools. Depending on the local COVID Risk Severity Classification, there were various learning delivery alternatives such as limited to face-to-face, blended learning, distance learning, and homeschooling, as well as other modes of delivery

With the resumption of classes, there is still a concern about educational quality. Considering mathematics is recognized as a difficult subject, the majority of students dislike it. Even parents feel that it is a tough subject for their kids to study yet their performance in mathematics is still extremely important for them. [4]. In addition to this, students are also obliged to learn on various learning platforms during this pandemic. Both students and teachers are still adjusting to the new learning platforms offered by their respective schools.

Educational institutions are looking for short-term solutions to keep teaching going in the afflicted areas, but it's crucial to remember that the long-term solution is unknown. The classroom scenario is ideal in terms of learner motivation,

satisfaction, and interaction. According to several studies, the instructor's interactions with students significantly impact students' opinions of online learning. The primary source of concern is the learning quality that is linked to how well the content is presented, created, and put into action. Learning effectiveness is partly determined by how content is chosen for the online environment, as well as an understanding of and response to student constraints. Online learning was determined to be useful since it offered learners flexibility and convenience. Students valued well-designed materials. Organized content with recorded videos available on the university's website. Having interactive sessions with quizzes is required to maximize the learning experience, and assignments at the end of each lesson. However, because of technological constraints, students' demographic profiles, delayed feedback, and the instructor's inability to handle them effectively, online classes can be more challenging than traditional classrooms. Moreover, the study was conducted to address the need of each student to be an effective learner in the field of Mathematics. Thus, math educators must also evaluate their pedagogy and teaching strategies, articulate the specifics and benefits of their approach, and identify areas that could be improved [5]. This is necessary for the improvement of students in their mathematics classes under the new normal. As Central Mindanao University implemented classes in the new normal, students are also striving to learn. Although a lot of students are guaranteed scholarships during the online learning environment, there have been a lot of comments regarding the teaching strategies of teachers. Despite the fact that all courses at Central Mindanao University include mathematics as a general education subject, there has been little to no research on how mathematics classes are actually implemented or the problems and concerns that have an impact on student's performance in the subject during online classes. In order to improve mathematics education, this study looks

into how students view various aspects of the subject during the transition to new learning norms.

Thus, all of these factors should be considered when developing an online course to make it more effective and productive for the learner [6], particularly considering that the participant's results revealed a diverse demographic profile so learners are also learning in their own preferred ways.

2. METHODOLOGY

This study used a quantitative research design specifically descriptive correlational statistics to provide basic information on the students' demographic profile, teaching effectiveness, and the efficiency of instructional materials as perceived by the students, and analyze the relationship of the variables. Furthermore, the researchers utilized the chapter exam scores to measure their academic performance.

The researchers randomly selected first-year Bachelor of Secondary Education students taking up Mathematics in the Modern World from Central Mindanao University in Maramag Bukidnon. The respondents were chosen according to their willingness to participate in the study as they were selected randomly.

The researchers had given a survey questionnaire to the respondents through Google Forms.

This research utilized descriptive correlational statistics to provide basic information about the variables, particularly percentage, mean and standard deviation. Moreover, Pearson correlation measures the extent to which the variables are connected. Multiple regression was maneuvered in identifying the variable/s that may predict students' academic performance in mathematics.

A survey questionnaire was employed in the gathering of data. This allowed the researcher to gain insight and assessed the factors affecting the students' performance in Mathematics.

The researchers made a 30-item questionnaire which include 15 items for teaching effectiveness and 15 items for the efficiency of instructional materials as perceived by the students. It utilizes a 5-point Likert scale in which respondents choose their level of agreement with the statements with 1 meaning strongly disagree, 2 means disagree, 3 means neutral, 4 means agree and 5 means strongly agree [7]. It was also content validated and pilot tested with Cronbach's Alpha of 0.937. Meanwhile, the scores of their chapter exam were interpreted using a scale adapted from DepEd order 8 series of 2015 after scores were transmuted.

3. RESULTS AND DISCUSSION

This section presents the analysis and interpretation of data gathered from the respondents. Tables were also presented in this chapter for the purpose of analyzing the data. The order of the figures and interpretation are in order.

3.1 Demographic profile of the respondents

Table 1 presents and discusses the demographic profile of the respondents indicating the frequency and percentage.

This table depicts the respondents' demographic information as gathered during the conduct of the study. It was shown that most of the respondents were female which is 107 (71.3%) compared to the 43 (28.7%) male respondents. Also, the majority of the students are 19 years of age which is equal to 81 (54%).

Table 1: Demographic Profile of the Respondents

	Frequency	Percentage
Gender		
• Male	43	28.7%
• Female	107	71.3%
Age		
• 17 and below	2	1.4%
• 18	15	10.0%
• 19	81	54.0%
• 20 and above	52	34.6%
Monthly Household Income		
• 10, 000 below	96	64.0%
• 10, 000 – 20, 000	36	24.0%
• 21,000 – 30,000	17	11.3%
• 31, 000 and above	1	0.7%

The second number of students belonging to the age bracket of 20 and above that is 52 (34.6%). This is followed by 17 and 18 which have a frequency of 2 (1.4%) and 15 (10%) respectively. In addition, the majority of the students have a family income of below 10,000 pesos which is equal to a total of 96 (64%). Next is a monthly household income of 10,000 to 20,000 pesos which 36 (24%) of the respondents belonged to. This is followed by the range 21,000 – 30,000, and 31,000 – 40, 000 pesos which have a frequency of 17 (11.3%) and 1 (0.7%) respectively. Thus, Results from the participants showed a diverse demographic profile, indicating that students are also learning in their own preferred ways.

3.2 Scores of the respondents

This section presents and discusses the chapter exam score of students indicating the frequency, percentage, and qualitative description.

Table 2: Scores of the respondents

Score	Frequency	Percentage	Qualitative Description
40 – 50	33	22%	Outstanding
35 – 39	25	16.7%	Very Satisfactory
30 – 34	29	19.3%	Satisfactory
25 – 29	21	14%	Fairly Satisfactory
0 - 24	42	28%	Did not meet Expectations

The chapter exam score of the 1st year Bachelor of Secondary Education students taking Mathematics in the Modern World from Central Mindanao University SY 2021-2022 is shown in Table 2. Out of 150 students, there are 22% whose score ranges from 40 – 50 are considered "outstanding", 16.70% whose score ranges from 35 – 39 are considered "very satisfactory", 19.30% whose score ranges from 30 – 35 are considered "satisfactory", 14% whose score ranges from 25 – 29 are considered "fairly satisfactory", and 28% whose score ranges from 0 – 24 are considered as "did not meet expectations". Therefore, it is important for educators to be aware of the various factors that influence students' performance, such as their socioeconomic status and demographic, which have an effect on their academic progress.

3.3 Teaching Effectiveness as Perceived by the Students

Table 3 presents and discusses the teaching effectiveness as perceived by the students indicating the mean, standard deviation, and qualitative interpretation.

It reveals students have a positive perception of teachers' effectiveness in their Mathematics class based on the grand

mean which is 4.09, and it shows that teachers are effective in dealing with the subject offered in the class.

Table 3: Teaching Effectiveness as Perceived by the Students

Teachers' Effectiveness	Mean	SD	Interpretation
1. The teacher promotes individual work.	4.21	1.00	Effective
2. The teacher presents the contents following a clear and logical framework, highlighting the important aspects.	4.21	0.92	Effective
3. The teacher gives concise and appropriate instructions during the activities.	4.19	0.92	Effective
4. The teacher informs the students of the competencies they will be expected to acquire.	4.13	0.95	Effective
5. The teacher allows and encourages student participation.	4.11	1.10	Effective
6. The teacher provides initial and final overviews of the session and/or subject in class.	4.11	0.91	Effective
7. The teacher organizes activities for the student to actively participate in course assignments.	4.09	1.00	Effective
8. The teacher has a good command of the contents of the course	4.09	0.91	Effective
9. The teacher interweaves the content of the subject matter with other courses	4.07	0.95	Effective
10. The teacher provides clear information about objectives, bibliography, tutorials, contents, and assessment methods in the subject's curriculum.	4.07	0.94	Effective
11. The teacher encourages student interest and motivation to learn.	4.06	1.06	Effective
12. The teacher provides me with scientific information that allows me to gain a better and deeper understanding of the subject matter.	4.04	0.95	Effective
13. The teacher attends and responds clearly to questions asked in class.	3.99	0.97	Effective
14. The teacher asks relevant questions.	3.97	1.00	Effective
15. The teacher uses vocabulary appropriate to the level of the students.	3.97	0.96	Effective
Grand mean interpretation	4.09		Effective

All of the indicators of teaching effectiveness as perceived by the students were rated as effective. On the other hand, students mostly agreed with the statement "The teacher provides clear information about objectives, bibliography, tutorials, contents, and assessment methods in the subject's curriculum." with a mean score of 4.07, implying that there is indeed clear information regarding the subject curriculum. Students also agree with the statement "The teacher informs the students of the competencies they will be expected to acquire." with a mean of 4.13 which means that students are well-informed on what they are expected to learn in their subject. Although usage of vocabulary is slightly lower compared to the previous statements which are 3.97, it is still evident that students agreed with the statement "The teacher uses vocabulary appropriate to the level of the students." In addition, students have a positive perception of teachers' responses to their questions as they agreed with the statement "The teacher attends and responds clearly to questions asked in class." with a mean of 3.99. This shows that the students have a positive perception of the teacher's strategies and mastery of the subject in their virtual class which includes a framework of the subject that highlights important concepts and ideas and the encouragement of teachers to students to participate in class discussions. This also implies that with a clear set of competencies presented, the students have positive viewpoints on the activities given. Through employing various teaching strategies, teachers achieve the learning competencies with thorough planning and producing relevant materials needed for the discussions [8, 9]. Furthermore, as teachers engage students in class, their interest in learning is enhanced [10] while ensuring that these engaging activities are appropriate to the learners' capabilities and level, as well as the resources available [9].

3.4 Efficiency of instructional materials as perceived by the students

Table 4 presents and discusses the efficiency of instructional materials as perceived by the students indicating the mean, standard deviation, and qualitative interpretation.

It depicts the efficiency of instructional materials as perceived by the students with an overall mean of 4.12 and interpreted as efficient, which means that teachers are clear in dealing with class instructional materials.

The table also reveals the item with the lowest mean in the efficiency of instructional materials is in the following statements. "The level of difficulty is suitable with students' competence" and "Its layout is attractive" with a mean score of 4.01 and interpreted as efficient. However, it also shows the highest mean which is "The teaching materials are suitable with students' needs" with a mean score of 4.27 and interpreted as efficient as well. This means that students agreed that the instructional materials play a significant role in making instruction and aids the teaching and learning process. Accordingly, the utilization of instructional materials has been discovered to be a powerful method for effective mathematics teaching and learning [11].

Table 4: Efficiency of Instructional Materials as Perceived by the Students

Instructional Materials	Mean	SD	Interpretation
1. The teaching materials are suitable for students' needs.	4.27	0.99	Efficient
2. Graphics, pictures, illustrations, and concept maps are used.	4.25	0.93	Efficient
3. There is enough information on the material regarding the topic.	4.22	0.88	Efficient
4. Effects are appropriately used in the video and PowerPoint presentations.	4.18	0.97	Efficient
5. The materials are accessible and easy to download.	4.18	0.96	Efficient
6. Activities and examples in the material move from simple to complex.	4.15	0.86	Efficient
7. The material is up-to-date.	4.15	0.86	Efficient
8. The examples in the material are appropriate for our levels.	4.12	0.93	Efficient
9. The materials are interesting.	4.07	1.00	Efficient
10. It is compatible with the background knowledge and level of students.	4.07	0.89	Efficient
11. There is an efficient use of texts and visuals.	4.06	0.97	Efficient
12. The material is easy to follow.	4.05	0.97	Efficient
13. The material is comprehensive.	4.04	0.93	Efficient
14. Its layout is attractive.	4.01	1.01	Efficient
15. The level of difficulty is suitable for students' competence.	4.01	0.96	Efficient
Grand mean interpretation	4.12		Efficient

3.5 Correlation analysis of independent variables to the academic performance of the respondents in Mathematics

This section discusses the degree of independent variables to the academic performance of the respondents in Mathematics.

Table 5: Correlation analysis of independent variables to the Academic Performance of the respondents in Mathematics

Variables	R-Value	P-Value
Gender	0.1697	0.0379*
Income	0.2190	0.0071
Age	-0.0242	0.7691
Teaching Effectiveness	0.0143	0.8617
Efficiency of Instructional Materials	0.0816	0.3210

*Correlation is significant at the 0.05 level (2-tailed)

*Correlation is significant at the 0.01 level (2-tailed)

Table 5 shows the correlation analysis, and it revealed that gender and income have ($r=0.1697$, $p>0.037$) and $r=0.2190$, $p>0.0071$), this implies that the variables have a weak correlation and have a significant relationship with the academic performance of the students. The increase in income will likely have a little increase in students' academic performance. Students' age affects their academic success in

mathematics [4]. In addition, Jabor, Kungu, Machtmes, and Buntat, found in their study that students ages below 19 have higher academic performance than that of above 19 students, and the correlation between their age and academic performance diminishes. Thus, explaining the weak correlation between age and the student's academic performance in mathematics. Furthermore, the household income of the respondents also shows that there is a clear division between those who can afford the new normal education costs and those who cannot [12], and the income inequality among students also undesirably influences their academic performance [13].

Teaching effectiveness has an ($r=0.0143$, $p<0.8617$), the result indicates that the variable has a significant relationship and is positively correlated with the student's academic performance. The result implies that for every increase in teaching effectiveness, there was a significant increase in students' academic performance of 0.0143. Teachers must select appropriate teaching strategies to achieve the learning objectives. This would be done through lesson planning and producing relevant instructional materials as well as training for teachers to facilitate learning. As a result, teachers who are happy and upbeat will actively participate in the teaching and learning process [8, 9].

Consequently, for the Efficiency of Instructional Materials, it has ($r=0.0816$, $p<0.3210$), the result indicates that the variable has a significant relationship and positively correlated with the student's academic performance. The result implies that every increase in the efficiency of instructional materials will likely have a little increase in students' performance. The utilization of instructional materials has been discovered to be a powerful method for effective mathematics teaching and learning [11]. For the successful teaching and learning of any subject, both teachers and students require instructional materials.

3.6 Regression analysis of independent variables to the academic performance of the respondents in Mathematics

This section discusses the regression analysis model of independent variables to the academic performance of the respondents in Mathematics.

Table 6: Regression Analysis of independent variables to the Academic Performance of the Respondents in Mathematics

Source	DF	Sum of Square	Mean Square	F Value	Pr(>F)
Model	5	1309.7378	261.9476	2.86	0.0171
Error	144	13190.4555	91.6004		
Total	149	14500.1933			

Variables	Beta	t-value	p-value	ANALYSIS
(Constant)	11.43	0.67	0.5013	
Gender	3.33	1.89	0.0608	
Age	0.58	0.70	0.4850	
Income	4.37	2.56	0.0115	Significant
Teaching Effectiveness	-3.61	-1.72	0.0878	
Efficiency of Instructional Materials	3.62	1.66	0.0982	
$R = 0.3004$ $R^2 = 0.0903$ F-Value = 2.86 SIG. = 0.0115				

Table 6 shows the regression analysis model: $Score = 11.43 + 3.33(Gender) + 0.58(Age) + 4.37(Income) + (-3.61)(Teachers$

Effectiveness + 3.62(IMS Efficiency) is significant with a p -value = $0.0171 < 0.05$. In addition, the household income shows significance with p -value = $0.0115 < 0.05$. Among the independent variables presented in Table 5, income rendered significance to the academic performance of the respondents in mathematics. The result of regression analysis clarified that the coefficient of income had the greatest degree of influence considering its 4.37 beta coefficient which means that for every standard deviation unit increase in income, there is a corresponding 4.37 increase in the academic performance of the students. The t -value of 2.56 is a highly significant relationship having a p -value of 0.0115. Therefore, income has a significant relationship with students' academic performance. The r -squared value of 0.0903 indicates that 9.03% of student's academic performance was explained by income this implies that students with higher income have better performance. Subsequently, 90.97% of the student's performance can be attributed to other variables. Moreover, the result implies that it is positive.

4. CONCLUSIONS AND RECOMMENDATIONS

Based on the results, conclusions, and recommendations are drawn:

The demographic profile of education students in Central Mindanao University taking Mathematics in Modern World SY 2021-2022 appeared that participants had varied demographic profiles. It is highly suggested that teachers know the student's demographic information and their social status as it affects their academic performance. Teachers must also exert more effort in encouraging learning in male students as there is a significant difference in their academic performance compared to female students.

Teachers' effectiveness as perceived by the students during the new normal has a grand mean score of 4.09 and has a qualitative interpretation of "effective".

Additionally, the level of efficiency of instructional materials as perceived by the students during the new normal has "efficient" qualitative interpretation with a grand mean score of 4.12. This positive perception of students on teachers' effectiveness and efficiency of instructional materials must be reinforced to give more impact on their academic performance. And suggested that teachers' knowledge and skills must be enhanced through seminars and training on new normal education.

Personal and socio-economic characteristics revealed that age, gender, and economic status have a weak correlation with the student's academic performance. However, age, gender, and economic status have a significant relationship with the student's academic performance. Teachers also suggested considering students' household income in giving tasks during the new normal education in a way that students are not too burdened with financial expenses to accomplish assigned tasks.

In students' academic performance and teachers' effectiveness, results indicate that the variable has a significant relationship and is positively correlated. It is recommended to study further the factors and explore additional aspects that may affect students' academic performance since there is a wide range of participants from different courses and they are encouraged to investigate different students of the institution.

REFERENCES:

- [1] Abdu-Raheem, B. O. (2014). Improvisation of instructional materials for teaching and learning in secondary schools as a predictor of high academic standard. *Nigerian Journal of Social Studies*, XVII (1), 131-143.
- [2] Pokhrel, S. and Chhetri, R. (2021) A Literature Review on Impact of COVID-19 Pandemic on Teaching and Learning
- [3] Unicef (2020). Education and COVID-19
- [4] Singh, A. (2018). Mathematics Toughest Subject, Not Taught Well In School: Survey
- [5] Uchang, J. (2022). Practices of the Twenty-first Century Mathematics Teachers. Volume 5. 225-230.
- [6] Muthuprasad, T., Aiswarya, S., Aditya, K. S., & Jha, G. K. (2021). Students' perception and preference for online education in India during COVID-19 pandemic. *Social Sciences & Humanities Open*, 3(1), 100101.
- [7] Preedy, V. R. (2010). Handbook of disease burdens and quality of life measures (Vol. 4). R. R. Watson (Ed.). New York: Springer.
- [8] Torres, K. et.al (2020) Teaching Effectiveness and Morale of Criminology Faculty of Laguna State Polytechnic University, Philippines
- [9] Radjuni, A. (2021) Teachers' Profile and Classroom Instruction Delivery: A case of a certain university in the Southern Philippines
- [10] Martin, F and Bolliger, D. (2018) Engagement Matters: Student Perceptions on the Importance of Engagement Strategies in the Online Learning Environment
- [11] Adebule, S., & Ayoola, O. (2016). Impact of Instructional Materials on Students' Academic Performance in Mathematics in Secondary Schools in Ekiti State, Nigeria. *Research Journal of Educational Studies and Review*, 2(1), 1-4.
- [12] Magsambol, B. (2020). Over 200,000 students transfer from private to public schools amid pandemic.
- [13] Workman, J. (2021) Income inequality and student achievement: trends among US States