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Describing the Relationship of Students' Interest and Academic Performance in Learning Mathematics Online

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ABSTRACT

This quantitative research study aimed to describe the students' interest and academic performance in learning Mathematics online. The study was conducted in Saint Columban College – Junior High School Department. The descriptive survey design was used for the study. In this study, the researchers used purposive sampling to select 52 research participants in Grade 10. Data were collected through an online survey in Google form. Pearson Correlation Coefficient was used for analysis to find out the significant relationship between students' interest and academic performance. The findings showed that most students were interested in learning mathematics online and their mathematics performance was outstanding. However, correlational analyses confirmed that students' interest in Mathematics was not significantly correlated to their performance in Mathematics online. The recommendation of this study emphasized more on the importance of igniting interest among students with lower mathematics performance.

KEYWORDS— *Students' interest, academic performance, online classes*

INTRODUCTION

Mathematics as a discipline is vastly vital in several academic, professional, and daily life areas. As stated by English & Gainsburg (2015), mathematical skills foster numerous proficiencies needed for problem-solving, decision making, and dealing with the complexities of daily life. These skills are essential in pursuing a wide range of promising careers and being successful in the workplace (Bakker et al., 2010; Budd et al., 2011).

According to Onyema (2019a), integrating emerging technologies in the teaching and learning process is no longer a choice but a need due to; the changing learning environment, demand for flexibility in methodology, and the need to enhance creativity and productivity in learning. Corinne (2018) opined that "emerging technologies have spawned the exponential development of software and AI-aided technology intending to adapt learning methods and customize curricula to fit each student's ability to move forward at his or her own pace." For Onyema et al., (2019), technology has modified teachers' method from the traditional approach that often places them as dispensers of knowledge to a more flexible system where they act more as facilitators, mentors, and motivators to inspire students to participate and

learn. The use of appropriate educational technologies increases the accessibility to learning resources and multiple learning approaches to meet the needs of diverse learners (Luzano, 2020). Educational technologies facilitate student-centered learning and problem-based education (Onyema et al., 2020). There are emerging trends in the use of technology in learning. Nano-learning (n-learning) is the latest term in the natural progression: from distance learning (d-learning), flexible learning (f-learning), electronic learning (e-learning), blended learning (b-learning), and the recent addition, (mobile) m-learning (International Federation of Surveyors (FIG, 2010). There is also now ubiquitous Agile learning, all of which are tailored toward learner-centered education, problem-based learning, and productivity in learning.

Another factor that can result in low achievement in mathematics may be attributed to students' lack of interest in learning mathematics, as stated by Luzano (2023). The studies have also shown that students' attitude toward problem-solving in terms of patience, confidence, and willingness has a positive relationship with students" mathematics achievement (Mohd et al., 2011).

The current trends in education confirm that instructors are shifting away from authoritarian and non-interactive methods (Galy et al., 2011) to a learner-centered approach that includes the use of technology. The use of e-learning platforms is growing as the education industry moves towards virtual or remote education. The transition to E-learning is fast becoming the new reality in global education systems. E-learning has become popular because it provides more flexible access to content and instruction from any location (Means et al., 2009). According to Oye et al. (2012), E-learning has become an increasingly popular learning approach in higher educational institutions. Today's modern classrooms, whether online or conventional-based, use e-learning tools and Learning Management Systems that capture student cognition and engage them in the learning process (Galy et al., 2011).

With e-learning platforms, learners can learn on the go, defeating the barriers of distance, time, and physical presence. Hence, the researchers aimed to find out the students' interest and academic performance in learning Mathematics online.

1.1 *Promoting Student's Interest in E-learning/Online Platform*

The low participation of students in institutional e-learning platforms has become a source of concern to many stakeholders in education (Pang-an, et al, 2022). Although poor participation of students in institutional e-learning platforms might not be a problem in advanced climes, it is a challenge in many developing countries. This could be attributed to several factors as discussed in the previous section of the present study. Onyema et al (2019a), suggested the provision of good internet infrastructures at the campus/students' accommodation areas, and grading of students' attendance to promote their participation in e-learning platforms. Educators need to scaffold student motivation by being explicit about expectations and ground rules for online discussion forums, for this sets the framework for interaction, peer collaboration, and dialogue (Xia et al., 2013).

E-learning requires immediacy, and teachers must devote more time to provide responses or feedback to students. The provision of prompt answers to specific questions would stimulate students' interests and participation in e-learning platforms. Teachers must be creative in their content creation and identify ways to make them attractive to students and accommodate diverse learners or styles. The course guides and learning objectives must be clearly stated in

line with the expectation of the students. The culture of abstinence in e-learning classes must be checked by institutional policies (Aranzo, et al, 2023). The provision of supportive infrastructures like good internet facilities and electricity could enhance learners' participation (Onyema et al, 2019a). Many have suggested the award of marks to stimulate students' participation in e-learning activities (Waleed et al., 2019, & Onyema et al., 2019a). However, Hubble (2009), found that the allocation of marks for participation in e-learning activities can, but doesn't always increase students' participation. Despite the introduction of assessments and grading in e-learning platforms, many students may not still be interested in participating. Therefore, there is a need for more training and orientation for students to enable them to understand and appreciate the importance of e-learning adoption and participation.

1.2 The Impact of Online Learning on Academic Performance

According to Chun and Heo (2018), flipped learning improves both self-efficacy and academic performance, and Carmichael et al., (2014) give empirical evidence that students who spent more time online improved their course grades significantly. Brielmaier et al., (2016) found that students' computer or internet self-efficacy and motivation for learning had a direct, positive effect on their academic performance. Wei, & Chou (2020) found that students' computer or internet self-efficacy for learning had a direct, positive effect on their academic performance. Course satisfaction and online discussion score. There is a significant but weakly positive relationship between students' engagement in the online module and their performance in the final learning activity (Santally et al., 2020); and instructional strategies that facilitate cross-cultural collaborative online learning, such as group work, self-introductions, and cultural awareness activity, computer-supported collaborative learning activity, the inclusion of global examples, and international ability (Kumi-Yeboah, 2018).

Students had higher test scores using the online tool compared to multiple-choice paper-and-pencil exam marks, according to MacIsaac et al., (2019), & Akhter et al., (2018) demonstrate that improving online technology fosters dynamic learning opportunities for students through online education. The total number of attempts and performance in individual online learning activities are determinants of the ultimate course grade (Foung, & Chen, 2019). The best predictor of students' achievement was a hybrid data set incorporating online and traditional essential components (Lu et al., 2018). In an online web-based course, learner engagement and LMS use might be evaluated in terms of academic success (Strang et al., 2017 & Alkis et al., 2018); in the meantime, Zhang et al. (2020) concluded that personalized learning improves academic performance. In a mixed learning setting, intervention can effectively increase students' learning behaviors, attitude, motivation, self-efficacy, and academic achievement. Although learning achievement was not significant, students' engagement in the online learning community was higher than those who only used the English learning system (Lai et al., 2019), & Mercer (2018) confirmed the predictive effects of online learning attitudes and online learning readiness on student motivation; and Bailie (2019) shows the influence of learner preterm access to graduate-level courses delivered entirely online.

Furthermore, Adino (2015) stated that students expressed like or dislike of Mathematics depending on how the content was delivered. They naturally formed a given attitude on the subject that eventually determined their level of success in that course. When students positively perceived the content to be learned as interesting, fun, meaningful, and relevant, they got motivated to learn, well stimulated and their interest was aroused in readiness to

understand the content being presented to them by the teacher. Despite its significance, not all students perform well in Mathematics. It can be accredited to many factors that affect their academic learning performance . Interest has to do with preparedness or mastery of a subject–matter background knowledge that can enable the learner to cope with a further or next higher level of learning of the subject- matter or related learning task. Both factors associated with Mathematics interest include student factor, teacher factor, Mathematics anxiety, government, lack of infrastructural facilities, lack of instructional materials, and the problem of large class size (Idigo, 2012).

METHODS AND PROCEDURES

Research Design

This is a correlational research design whereby the association between two variables was investigated. This research has used the descriptive survey method in gathering data. According to Salaria (2012), the descriptive survey method is concerned not only with the characteristics of individuals but with the characteristics of a whole sample. It is devoted to gathering information about prevailing conditions or situations for the purpose of description and interpretation (Aggarwal, 2008).

Research Locale

The study was conducted in one of the private educational institutions run by the Roman Catholic Diocese of Pagadian in Pagadian City, Philippines, and founded in 1957.

Research Participants

The participants of this study are the 52 students in Grade 10 level of Saint Columban College Junior High School Department who enrolled in this Academic Year 2021-2022.

Research Instruments

This study used a questionnaire checklist as the instrument to gather the data needed for the study. The checklist questionnaire consists only of one part. The statements were adapted from the published research of (Hasni & Potvin, 2015) on the students' interest in learning online.

To determine the mathematics performance of the respondents based on the third grading grade, the hypothetical range was used in line with the Dep-Ed order No. 8 Series 2015.

Data Gathering Procedure

To collect the necessary data, the researchers had produced a letter requesting the principal of Saint Columban College Junior High School Department for authorization to conduct the study of Grade 10 students.

Upon the approval, the researchers asked permission from the teachers of all the Grade 10 students to administer a questionnaire – checklist.

The researchers then introduced themselves to the students and gave a brief explanation about the purpose of the study. After the necessary data is collected, the researchers go through the process of tallying, analyzing, and interpreting the data as well as the students' data.

Data Analysis

According to Zan & Martino (2007), students' interest in Mathematics is defined as a more complex scenario characterized by the emotions that one associates with Mathematics, one's beliefs about Mathematics, and how one behaves toward Mathematics.

Ethical considerations

The researchers are responsible for protecting research participants from any risk or harm associated with participation in the research, sticking to ethical management practices below, and conducting research that meets the scientific standards in education. One of this study's goals is to ensure that all participating members of this research follow widely accepted standards for the ethical, professional, and scientific conduct of the study's design regarding the implementation, dissemination, and reporting.

Confidentiality. The collected insights and data from the participants will be kept private to avoid any biased intake from other participants.

Voluntary Participation. The researchers will decide what to do even though they requested participants to fill out the form because research participants must give their permission to be part of the study and must be given enough information to provide.

RESULTS AND DISCUSSION

The research was conducted to determine the student's interest and academic performance in learning Mathematics online in Grade 10 students.

Level of Student's Interest

As presented in Table 1, all the positive indicators of students' interest in learning Mathematics online posted a mean interpreted as *interested*. The indicator 7: "When I can't understand something in Mathematics, I always find a way to understand it", showed the highest weighted average mean of 3.38 interpreted as *highly interested*. In addition, most of the students *disagree* with the indicator 4: "If I had a choice, I wouldn't attend online classes in Mathematics", as it also showed the lowest weighted average mean of 2.31 interpreted as *less interested.*

Generally, the student's interest in learning Mathematics online obtained a 2.88 weighted average mean with an adjectival equivalent of *"Agree"*, interpreted as *"Interested"*.

Students' Academic Performance

The students' academic performance in Mathematics was based on the 3rd quarter grade of 52 student-respondents during Academic Year 2021-2022.

Level of Students' Mathematics Performance. The data of the students' mathematics performance were shown in Table 2.

As revealed in Table 2, 40% of the students garnered a grade of 90-100 interpreted as *outstanding*; 27% of the students garnered a grade of 85-89 interpreted as *very satisfactory*. However, 21% of the students garnered *satisfactory* grades of 80-84 and only 12% of the students obtained a grade of 75-79. Hence, the table indicated that most of the students had

outstanding academic performance in learning mathematics online since 21 out of 52 students obtained a grade of at least 90% which is descriptively interpreted as *outstanding.*

Table 1

Students' Interest of Grade 10 Students in Learning Mathematics Online

Indicators	Weighted Average Mean	Adjectival Equivalent	Interpretation
1. Learning Mathematics online is fun.	2.91	Agree	Interested
2. Learning Mathematics online is boring.	2.37	Disagree	Less Interested
3. I should spend more time doing Mathematics online.	2.87	Agree	Interested
4. If I had a choice, I wouldn't attend online classes in Mathematics.	2.31	Disagree	Less Interested
5. I look forward to upcoming activities in Mathematics.	2.96	Agree	Interested
6. I would like to spend more time listening to the teacher in Mathematics class online.	3.21	Agree	Interested
7. When I can't understand something in Mathematics, I always find a way to understand it.	3.38	Strongly Agree	Highly Interested
8. In my Mathematics class online, I would like to spend more time explaining solutions to the class.	2.85	Agree	Interested
9. I would like to spend more time doing exercises in Mathematics.	2.96	Agree	Interested
10. I would like to spend more time consulting textbooks in Mathematics.	2.98	Agree	Interested
Overall Mean	2.88	Agree	Interested

Scale: 1.00 – 1.75 = Never Interested; 1.76 – 2.50 = Less Interested; 2.51 – 3.25 = Interested; 3.26 – 4.00 = Highly Interested

Also, it should be noted that the mean score of their mathematics performance is 87.85 which is interpreted as *Very Satisfactory* and with SD= 6.24 that indicates that the students in general shows a very satisfactory performance in learning mathematics online. Which is similar to the findings of Alpacion (2014), that revealed that the level of academic performance of the students was satisfactory.

Table 2

Mathematics Performance of Grade 10 Students Based on their 3rd Quarter Grade

Academic Performance		Percentage
Range of Values	Frequency	
90-100	21	40
85-89	14	27
80-84	11	21
75-79	6	12
Below 75	0	0
TOTAL	52	100
Mean= 87.85	SD= 6.24	Description: Very Satisfactory

Significance of Student's Interest and Mathematics Performance

Table 3. Pearson Correlation Coefficient Test on the Significant Relationship between Students' Interest and their Mathematics Performance in Learning Mathematics Online

Correlations

		Interest level	Grades
Interest level	Pearson Correlation	1	.142
	Sig. (2-tailed)		.317
	N	52	52
Grades	Pearson Correlation	.142	1
	Sig. (2-tailed)	.317	
	N	52	52

Ho: There is no significant relationship between students' interest and the mathematics performance in online classes for Grade 10 students.

Implications of the Study

The relationship between students' interest and mathematics performance of grade 10 was explored using the Pearson product-moment correlation coefficient. The rule of thumb by Cohen et al. (2007) was used for interpreting the results of *r* values in this study. No significant relationship was established between students' interest and mathematics performance for the 52 students, at $r = 0.142$ with $p = 0.317$. The result shows a very weak positive correlation and no significance for its value is greater than the designated alpha level (normally .05).

Therefore, there is no significant relationship between students' interests and the mathematics performance of grade 10 students. This is contrary to the findings of Maria de Lourdes Mata et al., (2012) the relationship between Math achievement and interest in Mathematics are consistent with research showing that good achievers develop more interest than lower achievers.

CONCLUSION

Based on the summary of the findings, the researchers concluded that the research participants have a strong interest in learning Mathematics online and excel academically. According to the findings of this study, interest is not significantly related to mathematical performance in general, particularly among those with higher mathematics performance. According to some studies, reciprocal effects such as personal variables (self-efficacy) and classroom practice may be the reason that interest is not a direct predictor of mathematics performance. In relation to this study, one possible explanation is that students with high mathematics performance were motivated to learn for extrinsic reasons, and their mathematics learning activities in the classroom were probably more structured because they had higher mathematics competency, and thus, despite having a lower level of interest in mathematics, they could still perform better in mathematics online. Students who were weaker in mathematics, on the other hand, were more interested in the subject than those who were stronger in mathematics.

Furthermore, the relationship between interest and mathematics performance was weaker for those with higher levels of mathematics performance and stronger for those with lower levels of mathematics performance. Given the significant relationship between mathematics performance and interest, teachers clearly need to do more to stimulate the interest of students who are less proficient in mathematics. Following that, students should be exposed to a diverse range of learning activities on a regular basis in order to imitate their teachers' mathematical problem-solving skills, and such repetitive behaviors should hopefully translate into learning mathematics habits.

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