STUDENTS' PERCEPTION OF THE MATH CLINIC IN THE STATISTICS SUBJECT AT CENTRE FOR FOUNDATION STUDIES, IIUM.

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Abstract: The Math Clinic at the Centre for Foundation Studies, IIUM, offers additional support for students in the Statistics subject. Understanding students' perceptions of this support service is important for improving its effectiveness. This study aims to evaluate students' perceptions of the Math Clinic's effectiveness, including the quality of tutoring, the learning environment, and the impact on their statistical understanding and academic achievement. A quantitative approach was used, with a survey administered to 79 students from various courses who attended the Math Clinic during Semester 3, session 2023/2024. Descriptive Statistics, including mean scores and standard deviations, were used to analyse the data, and inferential Statistics were employed to explore differences based on demographic variables using SPSS 28.0. The findings showed that students generally had positive perceptions of the Math Clinic, reporting high satisfaction with the tutors and the learning environment. Majority of students felt that the Math Clinic positively affected their understanding of Statistics and their academic performance. The study concludes that the Math Clinic is seen as a valuable resource for Statistics students.

Keywords: Students' Perception; Math Clinic; Statistics Subject; Academic Performance.

1. INTRODUCTION

Statistics is focused on gathering, evaluating, presenting, and arranging data. It offers resources and techniques for interpreting data and deriving conclusions from it. Statistics is essential in the field of business, information technology, accounting, economics, sciences, communication, industry, finance, and others. With its broad range of applications, Statistics is becoming an increasingly valuable discipline (Asmat et al., 2020). Statistics can be considered as one of the hardest courses for students to learn (Mat Zin, 2023; Saidi & Siew, 2018). It is also stated that, students' attitude, perception, expectations, motivation, and intellectual capacity are among the elements which contribute to

their inability to understand the Statistics subject. Based on Evans (2007), students' attitude about Statistics describes how they feel about the subject in terms of its importance, value, difficulty, and self-efficacy. Several statistical concepts such as probability, distributions and hypothesis testing are highly abstract and can be challenging for students to understand naturally. These difficulties can be lessened and make Statistics more understandable for students by using effective teaching techniques include stressing real-world examples, offering practical experience, and reducing arithmetic anxiety. Therefore, Math Clinic has been introduced to students to revise certain concept of Statistics before attending final examinations.

Math Clinics, which are frequently created as an extra classes or revision session are essential to get students ready for the examination. It is beneficial for certain topics where students may be having difficulty. This revision session frequently focusses on the most crucial topics and typical problem areas for the students. Basically, whatever has been taught throughout the course is reinforced and solidified in this session. According to Selvarajan and Thiyagarajah Vasanthagumar (2022), remedial instruction is one of the appropriate treatments for low achievers. Huang (2010) stated that the purpose of remedial education is to give low-achieving students more opportunities to reaffirm the fundamentals of common subjects so they can fulfil the requirements of the minimal academic standard.

The main objective in this study is to evaluate students' perception of the Math Clinic in terms of quality of tutoring and learning environment. Moreover, this research has also been conducted to explore the Math Clinic's impact on the students' statistical understanding.

Despite Math Clinics play a vital role in improving academic assistance, there is a significant research gap concerning students' opinions of the Math Clinic at IIUM's Center for Foundation Studies, specifically regarding the caliber of tutoring and the environment in which students learn. Besides, there is not enough thorough investigation on how the Math Clinic impacts the students' understanding of Statistics. This research is significant because the feedback from students indicates whether the Math Clinic is meeting their learning goals, helping them understand statistical topics and preparing them for the examination. Furthermore, it is crucial to investigate whether the Math Clinic is meeting its objective of enhancing students' comprehension of Statistics. Overall, the results of this study can be used to identify the Math Clinic's most successful features and those that require improvement.

2. METHODOLOGY

3.1 Population and sample

The population in this study were students taking Statistics in Semester 3, 2023/2024. Samples taken using purposive sampling techniques and the survey

questions on students' perception of Math Clinic in Statistics subject was conducted among students who attended the Math Clinic for Statistics in Semester 3, 2023/2024. Among all the respondents, 23 were male students and 56 were female students.

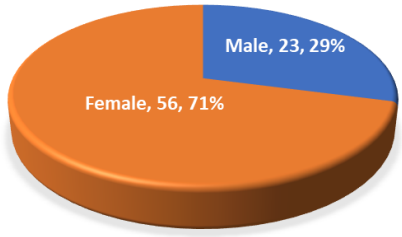

Fig. 1 Respondents' Gender

3.2 Data Collection

A set of questionnaires was used to measure the students' perception of the Math Clinic in Statistics subject. There were three constructs being measured with 6 items in each construct. These items were adopted from Kasim and Muhamad Sukri (2022) for construct *Quality of Tutoring*, Ado (2015) for construct *Learning Environment* and Kamaruddin et al. (2022) for construct *Statistical Understanding*. The scale used was 5-point scale which scale 1 represented "Strongly Disagree" and scale 5 represented "Strongly Agree".

3.3 Reliability of Items

The reliability test was done on all items in the questionnaires according to the three constructs, and the values of the Cronbach's alpha was found to be between 0.763 to 0.933 as shown in Table 1. The reliability was acceptable based on all the values of alpha which are more than 0.7 (Cortina, 1993). Therefore, we can conclude that the questionnaires were reliable and indicated high internal consistency within the items.

Table 1. Reliability of the questionnaire

Construct	No. of item	Cronbach's alpha value
Quality of tutoring	6	0.849
Learning environment	6	0.763
Statistical understanding	6	0.933

3. RESULTS AND DISCUSSIONS

3.1 Descriptive Analysis

For descriptive analysis, the mean scores and the standard deviation were calculated for each item in their constructs. Table 2 shows the mean scores for items under construct *Quality of Tutoring* ranged from 4.72 and 4.86. Item 3, which was "Lecturer is always open to the question-and-answer session" obtained the highest score of 4.86 out of 5.00. The low standard deviations displayed in Table 2 ranged from 0.416 and 0.639. These indicate the data distribution of the students' perception scores were tightly clustered and closed to each other. Based on Santiago-Carrillo et al. (2019), students valued the guidance and assistance from the Math Clinic to improve in their studies since the knowledge covered was up to the standards and high in quality.

Table 2. Descriptive Statistics for items in Quality of Tutoring

Quality of Tutoring	N	Mean	Std. Deviation
Item 1	79	4.84	0.541
Item 2	79	4.78	0.443
Item 3	79	4.86	0.416
Item 4	79	4.72	0.639
Item 5	79	4.84	0.541
Item 6	79	4.84	0.565

In Table 3, the mean scores for items under construct *Learning Environment* were obtained. The mean scores were from 4.11 to 4.78. Item 6 with mean score 4.78 was "Math Clinic session encourage students to engage with the topic being discussed" demonstrating the learning environment during Math Clinic improved students' engagement with the topic discussed. The standard deviations were from 0.498 to 0.961, which was low, and the students' responses were similar to each other. The learning environment adapted in the enhancement program such as mathematics engagement clinic have impact on the students' critical thinking, problem-solving skills and hence their mathematics achievement, based on Marquez (2022).

Table 3. Descriptive Statistics for items in Learning Environment

Learning Environment	N	Mean	Std. Deviation
Item 1	79	4.68	0.567
Item 2	79	4.37	0.835
Item 3	79	4.11	0.961
Item 4	79	4.71	0.535
Item 5	79	4.67	0.593

Item 6	79	4.78	0.498

The mean scores for items under construct Statistical Understanding were obtained in Table 4. It ranged from 4.35 to 4.72. The highest score was from Item 5, "When I have difficulties in mathematics, I know I can handle them." Here also the standard deviations were low, and the data were tightly clustered to each other. From past literature Bond et al. (2012), it was found that beliefs and attitudes towards Statistics work together towards the students' statistical understanding and knowledge. Hence, this will increase their performance in the subject.

Table 4. Descriptive Statistics for items in Statistical Understanding

Statistical Understanding	N	Mean	Std. Deviation
Item 1	79	4.59	0.670
Item 2	79	4.68	0.631
Item 3	79	4.35	0.817
Item 4	79	4.46	0.712
Item 5	79	4.72	0.639
Item 6	79	4.65	0.641

3.2 Correlation Analysis

In our study, correlation analyses were run for the null hypotheses of:

H_0: There is no correlation between the quality of tutoring and statistical understanding obtained from the Math Clinic.

H_0: There is no correlation between learning environment and statistical understanding obtained from the Math Clinic.

Table 5 represents the Spearman's Rho correlation coefficients which indicated that the constructs were significantly correlated with statistical understanding at 0.01 significance level since the p-values obtained for both tests were $p < 0.001$. It was found that the correlation coefficients were $r = 0.641$ and $r = 0.607$ for quality of tutoring and learning environment respectively, with the students' statistical understanding.

TABLE 5. Spearman's Rho Correlation Coefficients

		Constructs	
		Quality of Tutoring	Learning Environment
Spearman's rho	Statistical Understanding	0.641**	0.607**

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

Based on Table 6 from Dancey and Reidy (2014), the obtained coefficients in Table 5 showed that there was strong and positive relationship between quality of tutoring and the students' statistical understanding. Same goes to the relationship between the learning environment and the students' statistical understanding that showed strong relationship. This is in line with the idea that an extensive variety of elements of the learning environment are always connected to the students' academic progress (Lizzio et al., 2002). Definitely, the students' statistical understanding was not determined only by their intelligence. With reference to Hendy et al., (2014),among college students, there were significant associations and positive relationships between math beliefs and their math behaviors which lastly resulted in their math understanding and achievement.

Table 6. Interpretation of the level of relationship (Spearman's ρ)

Mean score	Interpretation
≥0.70	Very strong relationship
0.40-0.69	Strong relationship
0.30-0.39	Moderate relationship
0.20-0.29	Weak relationship
0.01-0.19	No or negligible relationship

4. CONCLUSIONS

As a conclusion, students demonstrated positive perception towards Math Clinic in terms of the quality of tutoring, learning environment and statistical understanding. Furthermore, the findings suggest that there is a significant correlation between students' understanding in statistical concepts with the caliber of tutoring they received, as well as the learning environment during Math Clinic. Therefore, this leads to the conclusion that the students' competency in Statistics can be greatly increase through a series of Math Clinic, with emphasis on the quality of the tutoring as well as maintaining a favourable learning environment throughout the session. These elements should be taken into consideration as it can boost the students' competence and comprehension in Statistics.

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