

Students' Online Learning Experiences with First-Year Mathematics Courses at the University of Guyana, Turkeyen Campus

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Abstract:

Online learning has become the most appropriate learning mode in numerous universities because of the COVID-19 pandemic. However, at the University of Guyana, there was little to no preparation in place to deal with the shift from face-to-face to the online mode of learning. During the pandemic, it was online learning that facilitated the university to keep its doors open. This study aimed at investigating students' online learning experiences with first-year Mathematics courses in the Department of Mathematics, Physics and Statistics, Faculty of Natural Sciences at the University of Guyana, Turkeyen Campus. The intended purpose of this study was to bring awareness of students' satisfaction with the online environment. Students' satisfaction with the online learning environment is critical to learning since their satisfaction is directly related to their learning experiences. In fact, literature suggests that satisfaction is positively correlated to academic performance. This research utilized questionnaires for the collection of data from students doing first-year Mathematics courses. To analyze the responses of the students' online learning experiences of mathematical concepts, descriptive statistics were used. The analysis of the results revealed that 40% of the students indicated that the online learning environment helped to improve their learning experiences. When it came to the learning of mathematical concepts and the meeting of learning needs, 40% of the students agreed that the online learning environment had a positive effect. Additionally, the majority of students were satisfied with their online learning experiences. The results of this study can be used to bring greater awareness and to help improve the online mode of delivery in first-year Mathematics courses at the University of Guyana, Turkeyen Campus.

Key Words: Online Learning Environment; First-Year Mathematics Courses; Student Experiences; Student Satisfaction; Student Assessment.

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I. Introduction

In recent times, educational structures around the world have been significantly affected by technological advancements which have resulted in innovative approaches to learning (Morewood, Ankrum & Bean, 2010, as cited in Karal et al., 2015). Therefore, educational institutions have been more inclined to adapt and use technology in learning environments (Roblyer, 2006, as cited in Karal et. al, 2015). As a result, online distance education has now become an alternative method of solving the many existing problems in education coupled with evolving needs (Schunk, 2008).

In today's world, online learning plays an integral role in the education system as it seeks to provide students with options of acquiring a sound education at an affordable cost. In addition, online learning offers a more flexible conducive learning environment where students are not restricted to a particular schedule. Therefore, the online distance learning model is now becoming a global preference (Newby et al., 2006). Online learning has now become a new trend in the education system especially at the tertiary level (Yen & Lee, 2011). In fact, it allows for better collaboration in a virtual setting in relation to peer to peer as well as instructor to student discussions simultaneously (Schwartz, 2014, as cited in Krishnan, 2016).

A major advantage associated with the online learning mode is that courses are easily accessible and can be done in a more flexible way (Callaway, 2012). This is predominantly applicable to the adult learner who might not be able to attend traditional face to face classes (Ilgaz & Gulbahar, 2015). According to Cole, Shelley, and Schwartz (2014) as cited in Krishnan (2016), students taking online courses are more inclined to collaborate with their peers and are more equipped to apply the knowledge gained. In contrast, some students in the online mode tend to be less focused and as a result may exhibit little knowledge retention.

In the year 2020, the world was hit with one of the deadliest pandemics, COVID – 19, which has resulted in about 91% of classes nation-wide being transitioned from face-to-face to the online mode of learning (Fox et al., 2020, as cited in Lopez et al., 2021). Prior to the pandemic, the University of Guyana conducted 100% face to face classes. As a result of the pandemic, the University of Guyana transitioned to deliver its programs fully online.

According to Johnson et al. (2020) as cited in Lopez et al. (2021), the drastic change from face to face to fully online classes have presented many opportunities as well as unique challenges for both the educator and the learner. Therefore, this research seeks to highlight students' online learning experiences with first-year Mathematics courses at the University of Guyana, Turkeyen Campus. Based on the findings of this study, educators will be enlightened on the challenges that students face while doing first-year Mathematics courses online and subsequently, take appropriate measures to address the challenges.

II. Material and Methods

This study utilized a descriptive survey design which was characterized by the collection and analysis of both quantitative and qualitative data using questionnaires. According to Taherdoost (2019), the questionnaire is one of the most essential tools in research. It is utilized by conducting surveys to answer specific and important questions by researchers and decision-makers. In fact, collection of data for assessment and research can be effectively obtained using surveys and questionnaires.

The target group comprised of two hundred and fifty first-year students, attending the University of Guyana, Turkeyen Campus, who were registered in first-year online Mathematics courses from the Department of Mathematics, Physics and Statistics, Faculty of Natural Sciences, in the academic year 2020/2021.

A questionnaire was developed to investigate students' online learning experiences with first-year Mathematics courses. Google forms was used to create and facilitate students participating in the survey to answer the questionnaire online. Students were informed that their participation is voluntary and their responses will be treated with confidentiality. The questionnaire was designed using a five-point Likert scale to collect students' responses that were analyzed for this study. According to Taherdoost (2019), the novel Likert scale comprised of five symmetrical and balanced points. The Likert scale statements range from strongly agree to strongly disagree. Additionally, the scale offers the impartiality to a participant to decide on the options in an independent way since the location of the neutral point on the scale falls precisely between strongly disagree and strongly agree (Lobsy & Wetmore, 2012; Tsang, 2012; Malhotra, 2006, as cited in Joshi et al., 2015).

Data analysis

To capture the student's online experiences, a questionnaire, named 'The Mathematics Online Experience Questionnaire', on students' online experiences in Mathematics was distributed to students enrolled in first-year Mathematics courses. A total of two hundred and fifty responses were received. Organization and presentation of the data was done using MS Excel software.

III. Results

Students' responses to the Mathematics Online Experience Questionnaire

Figure1: Online learning environment and students' learning experience

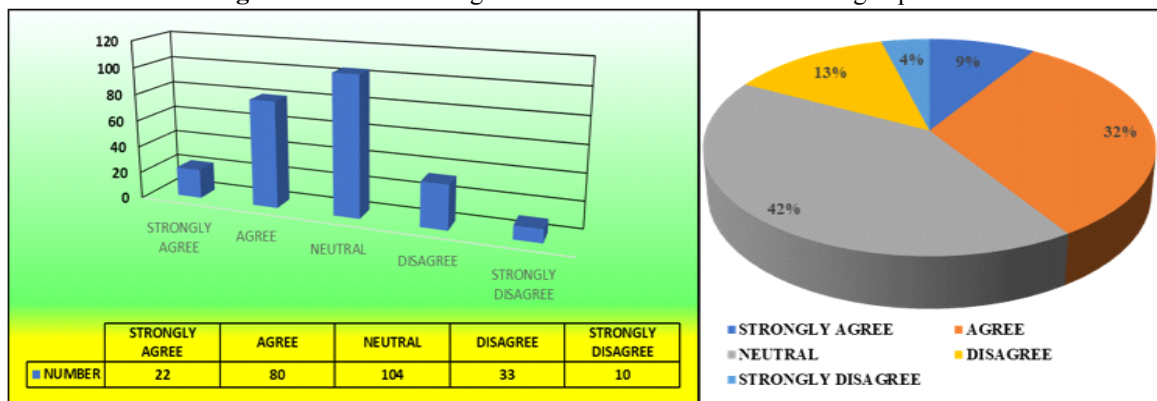


Figure 1 depicts the number of respondents and their views of whether the online learning environment helped improve their learning experience.

Figure 2: Online learning environment and students' satisfaction

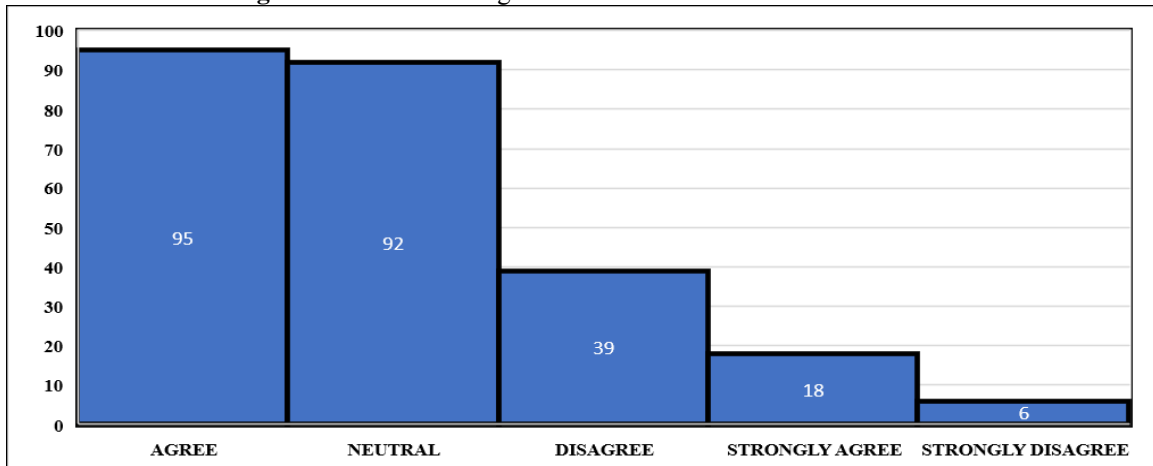


Figure 2 depicts the number of respondents and their views of whether they are satisfied with the online learning environment experience.

Figure 3: Online learning environment and student learning.

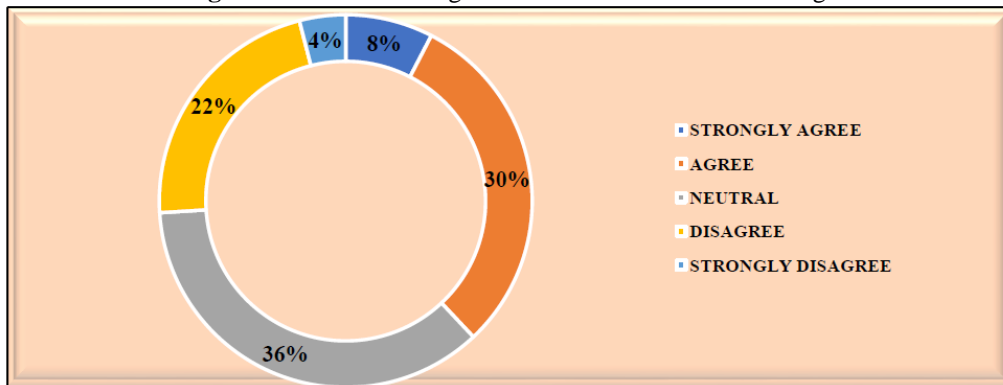


Figure 3 shows the percentage of respondents and their views of whether the online learning environment made it easy for them to learn first-year mathematical concepts.

Figure 4: Online learning environment and students' learning needs.

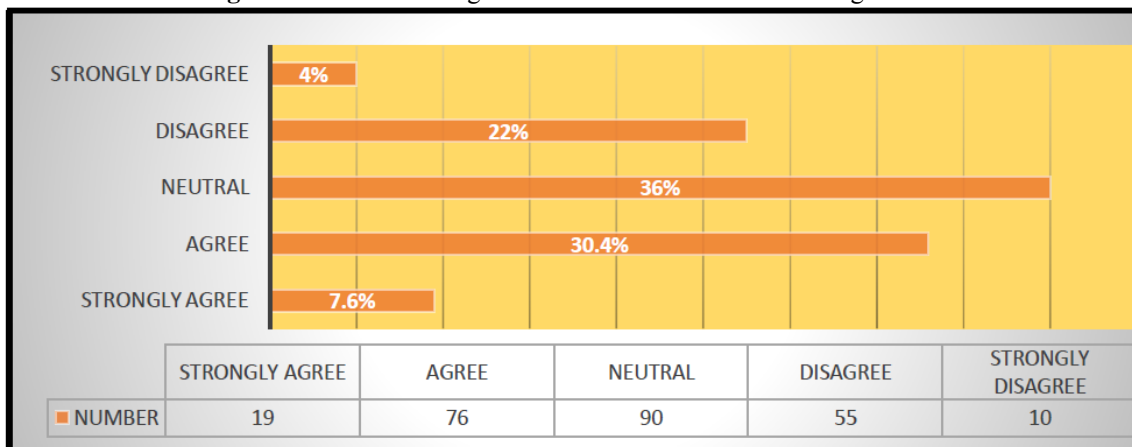


Figure 4 shows the number of respondents and their views of whether the first-year Mathematics courses done through the online learning environment met their learning needs.

Figure 5: Online learning environment and course materials.

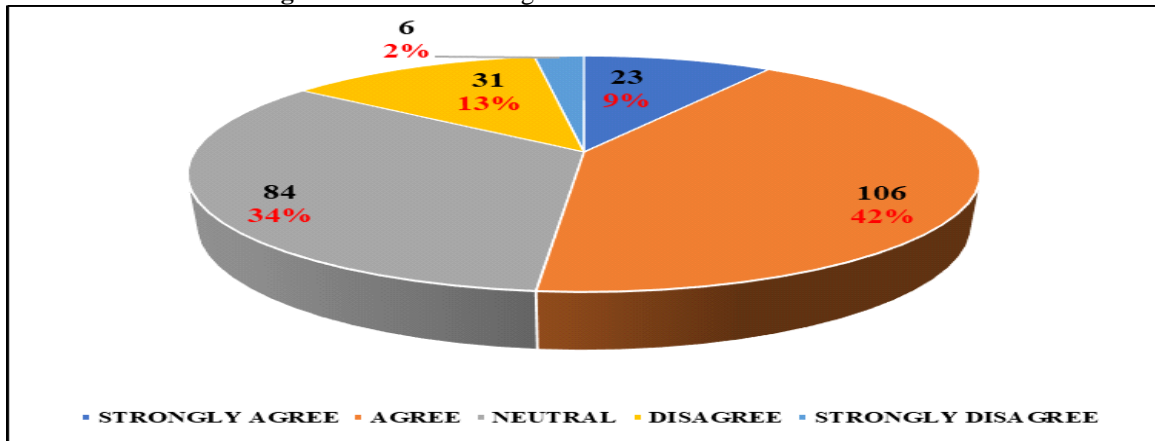


Figure 5 illustrates the percentage of respondents and their views of whether the course materials for first-year Mathematics, through the online learning environment was stimulating and aroused their curiosity to learn new concepts.

Figure 6: Online learning environment and students' experience

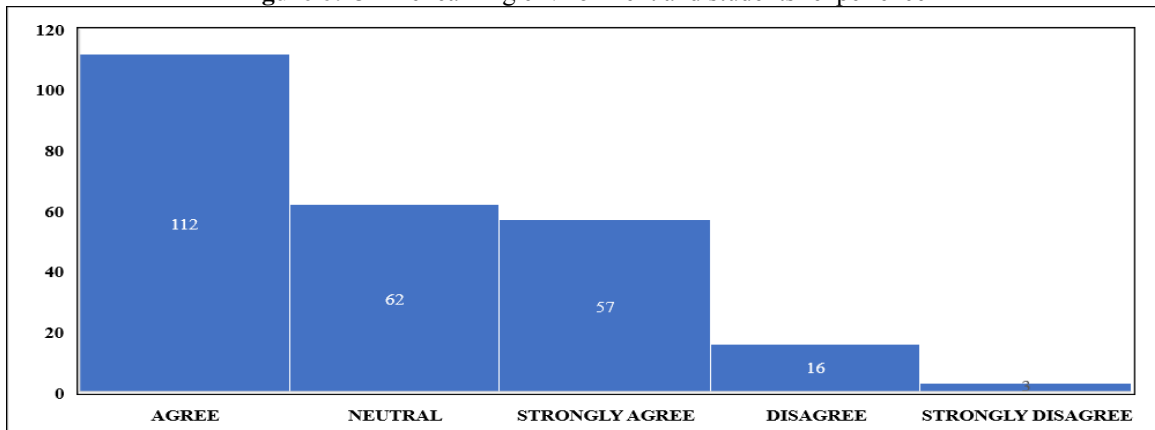


Figure 6 illustrates the number of respondents and their views of whether having access to efficient internet facilities further improved their experience in the online learning environment.

Figure 7: Online learning environment and students' experience

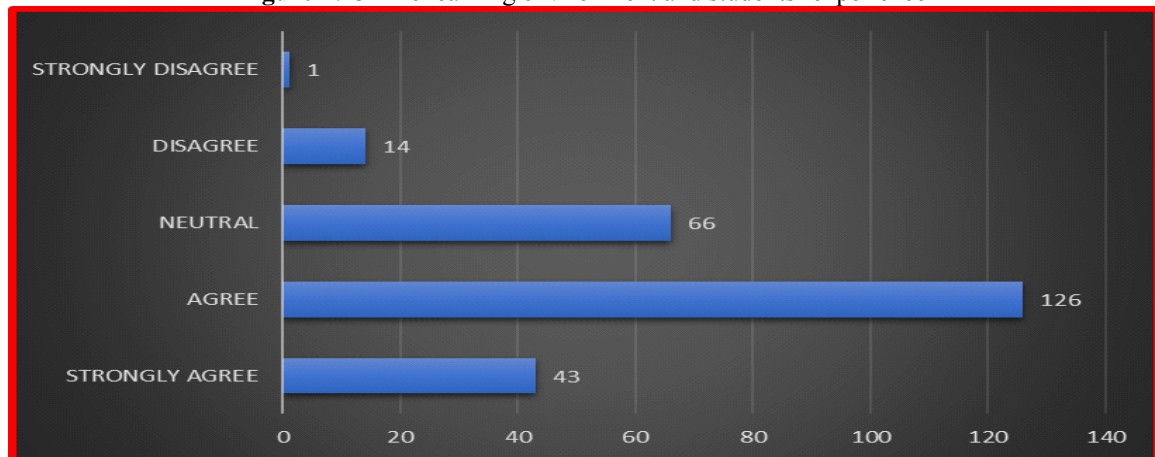


Figure 7 depicts the number of respondents and their views of whether having access to lecturers and tutors further improved their learning experience in the online learning environment.

Figure 8: Online learning environment and students' learning experience

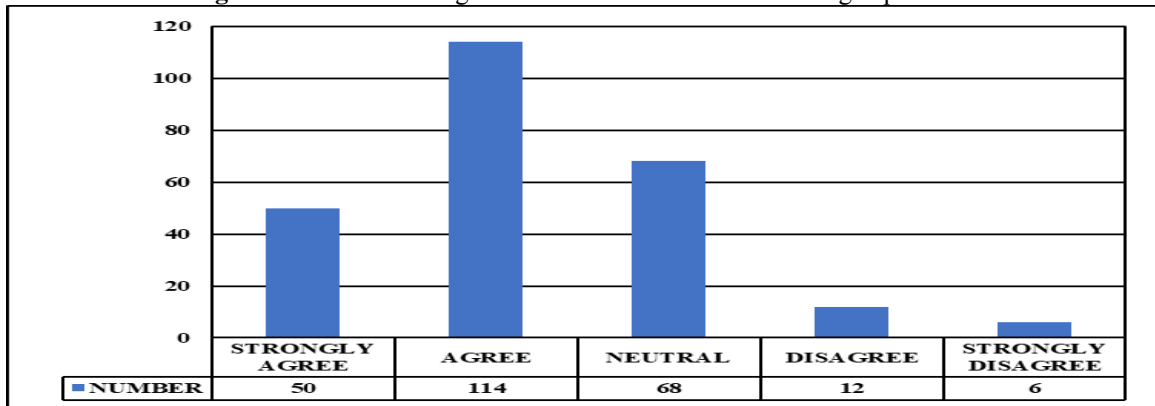


Figure 8 depicts the number of respondents and their views of whether using different forms of media enhanced their learning experience in the online learning environment.

Figure 9: Online learning environment and assessment

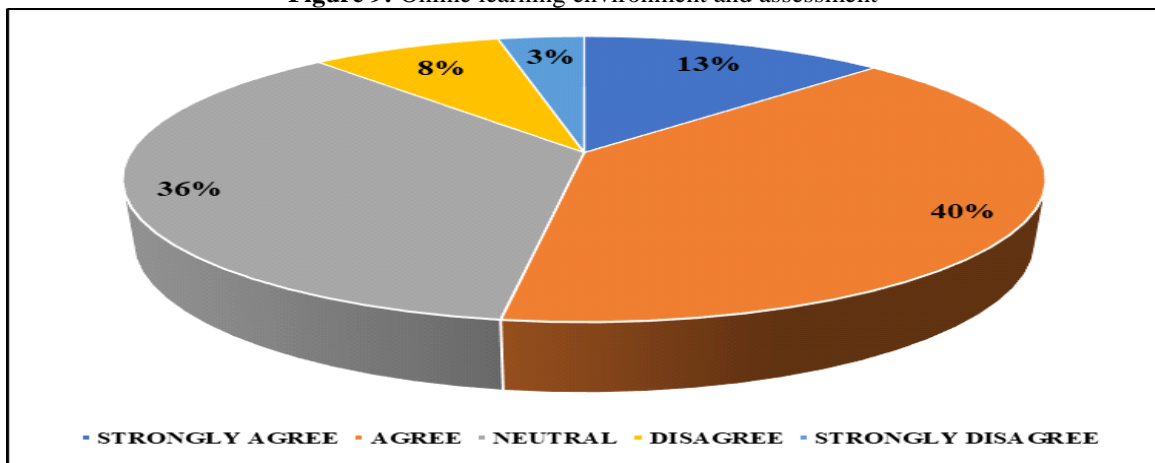


Figure 9 depicts the percentage of respondents and their views of whether the online form of assessment, of first-year Mathematics courses was effective and efficient.

Figure 10: Online learning environment and assessment feedback

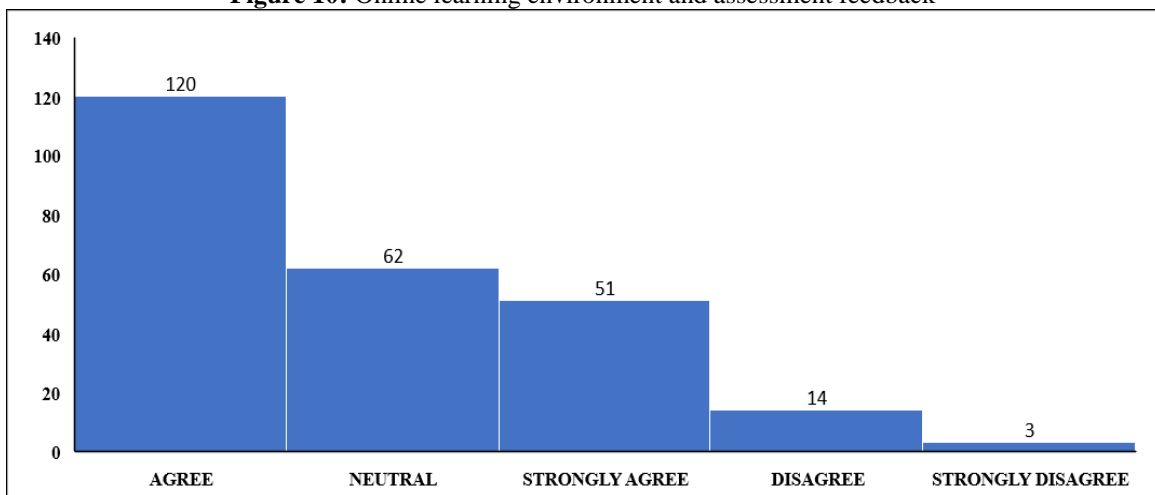


Figure 10 depicts the number of respondents and their views of whether the assessment feedback was prompt in the online form of assessment for the first-year Mathematics courses.

Figure 11: Online learning environment and student learning experiences.

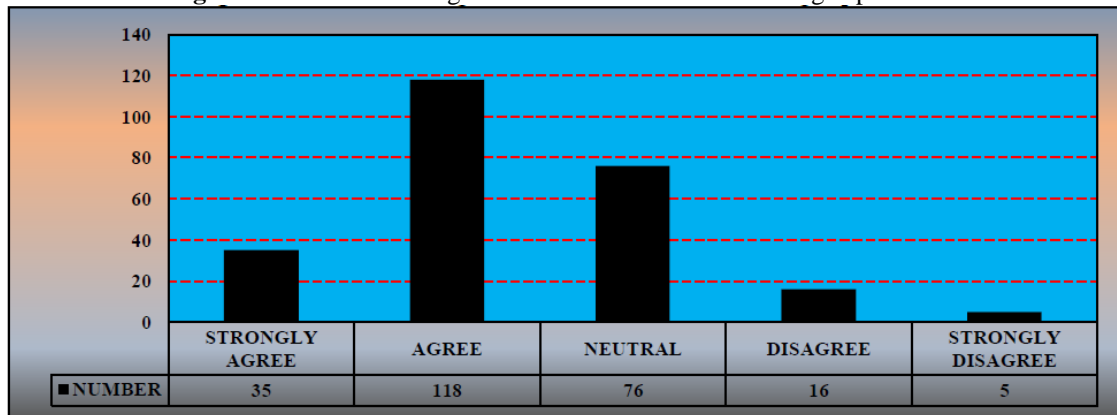


Figure 11 shows the number of respondents and their views of whether online collaboration with other students was very effective to foster learning and helps to improve their learning experience in the first-year mathematics courses.

Figure 12: Online learning environment and students' online experiences.

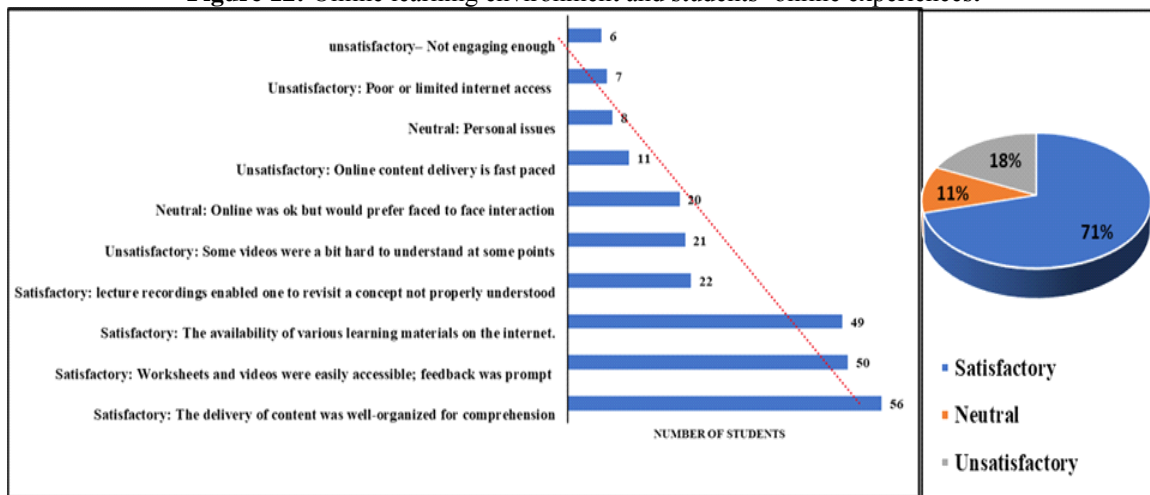


Figure 12 illustrates the views of the respondents stating what made their online learning experience with the first-year mathematics courses satisfactory or unsatisfactory.

Figure 13: Online learning environment and students' satisfaction

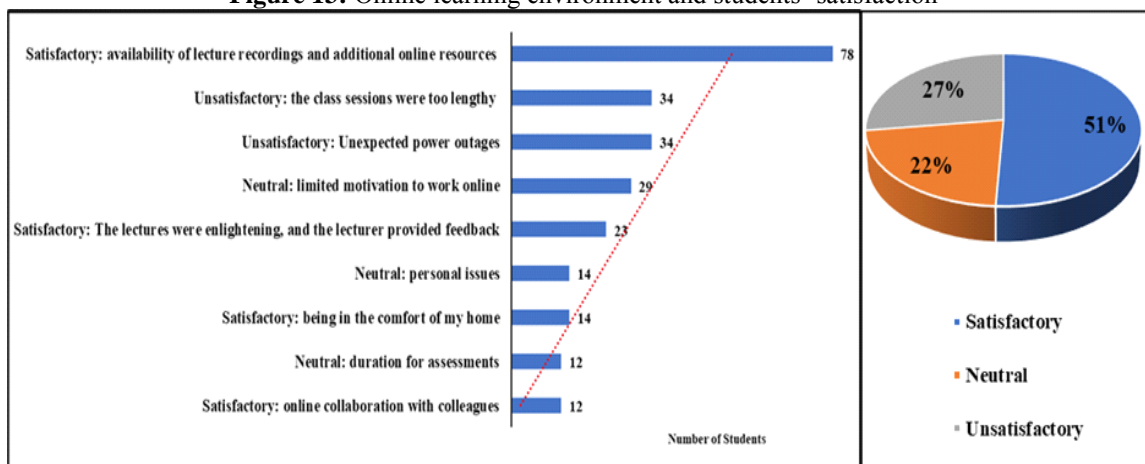


Figure 13 illustrates the number of respondents and their views of whether their online learning experiences was satisfactory or unsatisfactory and what factors contributed to their view.

Figure 14: Online learning environment and students' experiences

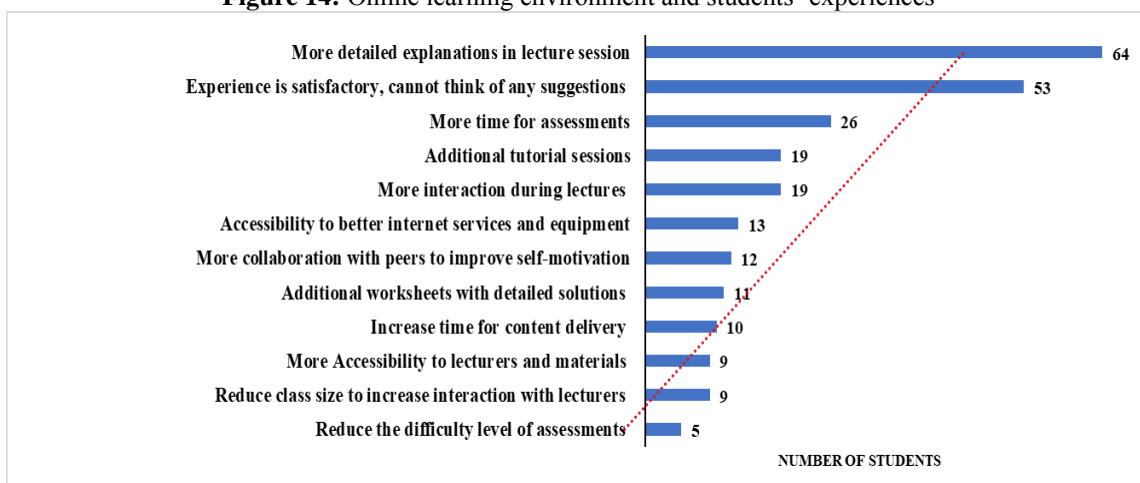


Figure 14 depicts the number of respondents and their suggestion on how to improve the online learning experiences of the first-year mathematics courses.

IV. Discussion

Analysis of students' responses to the Mathematics Online Experience Questionnaire

The results from the first question in the survey sought to capture whether the online learning environment helped to improve students' learning experiences. In Figure 1, it can be observed that 41% of the students stated that the online learning environment helped to improve their learning experiences. This observation coincides with the results from a similar study conducted with first-year university students taking Mathematics courses online where 41.1% of the students stated that the use of the online learning environment improved their learning experiences (Krishnan, 2016). According to Elshami et al. (2021), in order to achieve success in education, students' satisfaction with the new norm, online learning, is vital. In addition, 42 % have given neutral responses while 17% have disagreed with the statement. According to surveys conducted at U.S. Tertiary Institutions, 68 % of the students indicated they preferred a combination of in-person and online instructions (McKenzie, 2021). Thus, this could be a major reason for the 42% of students giving a neutral response.

In relation to satisfaction with the online learning environment experience, as shown in Figure 2, the majority of students were satisfied with their online learning experiences while a small amount was not satisfied. These results corresponded with a previous study which indicated that 64.71% of students were satisfied with their online learning experiences and preferred online classes, while 6% do not (Stankous and Buibas, 2018). In addition, according to McKenzie (2021), 73% of students in U.S. Higher Education Institutions were satisfied with their online learning experiences.

From the results in Figure 3, it can be observed that there were mixed views as it relates to whether the online learning environment made it easy to learn first-year mathematical concepts. 38% of the students agreed that it did, while 26% disagreed and 36% neither agreed nor disagreed. This observation is similar to that found in another study where 35.8% of students agreed that they better understood mathematical concepts because of the online environment (Krishnan, 2016). Further, studies have indicated that the use of online learning among adult students studying Mathematics have resulted in improvements in enthusiasm, independence, participation, learning concepts and performance (Aiken, 1976; Moreno-Guerrero et al., 2020).

As seen in Figure 4, students had varied views as it relates to their learning needs being met while doing the first-year Mathematics courses through the online learning environment. 38% agreed that it did, while 26% disagreed and 36% were uncertain. The results are consistent with the pattern seen on the application of Moodle online instruction and learning achievements from empirical studies. The literature indicates that there does exist varied views where some agree that their learning needs are being met while doing the first-year Mathematics courses through the online learning environment (Hung, 2007; Liu, 2010; Wang & Yu, 2012; Wiginton, 2013, as cited in Lin et al., 2016), while others pointed out that there isn't significant evidence to indicate that this is true (Hsu, 2010; Lin & Chen, 2007, as cited in Lin et al., 2016).

As shown in Figure 5, 51% of the students agreed that the course materials for first-year Mathematics, through the online learning environment was stimulating and aroused their curiosity to learn new concepts. The literature supports this finding since it indicated that the percentage of students who agreed that the online learning environment improved their ability to learn mathematics is 42.9% (Krishnan, 2016).

In Figure 6, out of the 250 respondents, 169 students agreed that having access to efficient internet facilities further improved their experiences in the online learning environment. Only 19 students disagreed and 62 students neither agreed nor disagreed. The result was not startling since literature does indicate that one of the obstacles students faced when involved in the online learning of Mathematics was inefficient internet access (Yushau & Khan, 2014; Ariyanti and Santoso, 2020; Reju and Jita, 2020).

From the results shown in Figure 7, out of the 250 respondents, 169 students agreed that having access to lecturers and tutors further improved their learning experience in the online learning environment. In addition, 15 students disagreed and 66 took a neutral stance. According to Krishnan (2016), 32.2% of the students indicated that communication was better with their lecturer with the online environment. Captivatingly, based on the results of this study 67.6 % of the students agreed, which is more than double the amount found in literature.

In Figure 8, out of the 250 respondents, 164 students agreed that using different forms of media enhanced their learning experiences in the online learning environment. In addition, 18 students disagreed and 68 were not sure. According to Ariyanti and Santoso (2020), using different forms of media such as Moodle, Google Classroom and Zoom positively affected students' Mathematics online learning experiences.

From the results shown in Figure 9, out of the 250 respondents, 53% of the students agreed that the online form of assessment, of first year mathematics courses was effective and efficient. In addition, 11% disagreed while 36% were undecided. The literature suggests that 37.5% of students found the online form of assessment competent and preferred it to traditional assessments (Krishnan, 2016).

For Figure 10, of the 250 respondents, 171 students agreed that the assessment feedback was prompt in the online form of assessment for the first-year mathematics courses. In addition, 17 students disagreed and 62 took a neutral stance. Literature suggest that prompt feedback is one of the features of the online learning environment that has a positive influence on Mathematics students (Reju and Jita, 2020). Thus, the results from the responses of the students in the study concurs with the findings of literature.

The results in Figure 11 revealed that out of the 250 respondents, 153 students agreed that online collaboration with other students was very effective to foster learning and helped to improve their learning experiences in the first-year Mathematics courses. Literature suggests that collaboration with peers is easier in an online environment (Krishnan, 2016). Thus, the results from the responses of the students in the study concurs with the findings of literature.

Figure 12 illustrates that of the 250 respondents, 71% were of the view that their online learning experiences with the first-year Mathematics courses was satisfactory while 18% was of the view that it was unsatisfactory and 11% indicated they were uncertain. The top four out of the ten views shared indicated satisfaction with the online learning experience during the first-year Mathematics courses. The most important reason given by students was that the delivery of content was well organized. In addition, students spoke of accessibility, availability and review of materials which are all features that are associated with online learning which affects students' experiences. Some areas of concern would be the choice of materials to be used since this was the number one area of concern among those students who indicated dissatisfaction with their online experiences. Interestingly, a small number of students, even though indicating a satisfying experience with the online learning environment, preferred face-to-face classes.

Figure 13 shows the nine factors that contributed to their views of whether their online learning experiences were satisfactory or unsatisfactory. The most noteworthy factor given was availability of recordings and additional resources. Creating of recordings is supported by literature where students suggested that when teachers make their own recordings, they can better understand mathematical concepts (Ariyanti and Santoso, 2020). On the contrary, the two next notable factors indicating unsatisfactory experiences are due to unexpected power outages and duration of sessions. However, for the nine factors stated, 51% of the students indicated a satisfactory experience.

For Figure 14, the 250 respondents gave twelve suggestions on how to improve the online learning experiences of the first-year Mathematics courses. The main suggestion is that there is a need for more detailed explanation in lecture sessions. Captivatingly, the second most popular suggestion indicates that their online experiences are satisfactory and as such there is no need to improve. This represents 21.2% of the total respondents or approximately one in every five students.

V. Conclusion

Based on the investigation into online learning of first-year Mathematics courses at the University of Guyana, Turkeyen Campus, it can be concluded that two in every five students indicated that the online learning environment helped to improve their learning experiences. Additionally, the majority of students were satisfied with their online learning experiences while a small number of students were not satisfied. Further, when it comes to the learning of mathematical concepts and the meeting of learning needs, four out of ten students agreed that the online learning environment had a positive effect. However, four out of ten students were not

sure. This uncertain view shows that student satisfaction in online learning is complex. Finally, even though the online environment did not remove the challenging nature of learning Mathematics, more than half of the students spoke to them being motivated to learn.

The majority of students indicated that their online experiences were satisfactory due to efficient internet facilities and having access to lecturers and tutors. In addition, the widely held view among students was that

their satisfaction was enhanced by the use of multimedia platforms in online learning. Further, one in every two students agreed that they prefer assessments in the online environment because of its effectiveness and efficiency. Moreover, most students were satisfied with their online experience due to prompt feedback. Finally, the majority of students indicated that part of the reason for having a satisfactory experience with first-year Mathematics courses at the University of Guyana, Turkeyen Campus, was that the environment enabled collaboration with other students.

Based on this study, out of the 250 respondents, 71% of the students were of the view that their online learning experience with the first-year Mathematics courses was satisfactory while 18% was of the view that it was unsatisfactory and 11% indicated they were uncertain. The reasons given for their satisfaction were: the organization of content delivery; accessibility, availability of lecture recordings and additional resources. On the contrary, reasons shared for an unsatisfactory experience were internet access and duration of instructional sessions.

Finally, 21.2% of the total respondents which correspond to approximately one in every five students suggested that their experiences with first-year Mathematics courses at the University of Guyana, Turkeyen Campus, were satisfactory and as such there was no need to improve. However, popular suggestions to improve their online learning experiences include: more detailed explanations; more tutorial sessions and additional time for assessments. Further, even though some students indicated there is no need to improve, it can be seen that most students believed that their experiences can be enhanced by improving on the same factors that have given them satisfactory experiences. These factors include: interaction and collaboration; accessibility to equipment and materials and time allotted for assessments. As such, the results of this study can be used to help improve the online mode of delivery in first-year Mathematics courses at the University of Guyana, Turkeyen Campus. This can be achieved through sensitizing the academic staff with the hope of modifying their course delivery in the online mode.

References

- [1]. Aiken, R. L. (1976). Update on attitudes and other affective variables in learning mathematics. *Review of Educational Research*, 46(2), 293-311.
- [2]. Ariyanti, G., & Santoso, F. G. (2020). The Effects of Online Mathematics Learning in the Covid-19 Pandemic Period: A Case study of Senior High School Students at Madiun City, Indonesia. *Mathematics Teaching Research Journal*, 12(3), 4-11.
- [3]. Callaway, S. K. (2012). Implications of online learning: Measuring student satisfaction and learning for online and traditional students. *Insights to a Changing World Journal*, 2. *Distance Education*, 35(3), 345-359.
- [4]. Elshami, W., Taha, M. H., Abuzaid, M., Saravanan, C., Al Kawas, S., & Abdalla, M. E. (2021). Satisfaction with online learning in the new normal: perspective of students and faculty at medical and health sciences colleges. *Medical Education Online*, 26(1), 1920090. <https://doi.org/10.1080/10872981.2021.1920090>
- [5]. Ilgaz, H., & Gulbahar, Y. (2015). A Snapshot of Online Learners: e-Readiness, e-Satisfaction and Expectations. *International Review of Research in Open and Distributed Learning*, 16(2), 171-187.
- [6]. Joshi, A. K. (2015). Likert Scale: Explored and Explained. *British Journal of Applied Science & Technology*, 7(4), 396-403.
- [7]. Karal, H., Kokoc, M., Colak, C., & Yalcin, Y. (2015). A Case Study on Online Mathematics Teaching with Pen-based Technology: Experiences of Two Instructors. *Contemporary Educational Technology*, 6(4), 319-337.
- [8]. Krishnan, S. (2016). Students' Perceptions of Learning Mode In Mathematics. *The Malaysian Online Journal of Educational Sciences*, 4(2), 32-41.
- [9]. Lin, Y. W. (2016). The Effect of Blended Learning in Mathematics Course. *EURASIA Journal of Mathematics Science and Technology Education*, 13(3), 741-770.
- [10]. Lopez, S. R., Bruun, G. R., Mader, M. J., & Reardon, R. F. (2021). The Pandemic Pivot: The Impact of COVID-19 on Mathematics and Statistics Post-Secondary Educators. *International Journal for Cross-Disciplinary Subjects in Education (IJCDSE)*, 12(1), 4369-4378.
- [11]. McKenzie, L. (2021, April 27). Survey reveals positive outlook on online instruction post-pandemic. [Www.insidehighered.com. https://www.insidehighered.com/news/2021/04/27/survey-reveals-positive-outlook-online-instruction-post-pandemic](https://www.insidehighered.com/news/2021/04/27/survey-reveals-positive-outlook-online-instruction-post-pandemic)
- [12]. Moreno-Guerrero, A.-J., Aznar-Díaz, I., Cáceres-Reche, P., & Alonso-García, S. (2020). E-Learning in the Teaching of Mathematics: An Educational Experience in Adult High School. *Open Access Scientific Journal*, 8(5), 840.
- [13]. Newby, T. J. (2006). *Educational technology for teaching and learning*. Upper Saddle River, NJ: Prentice Hall.
- [14]. Reju, C. O., & Jita, L. C. (2020). A Comparative Investigation of Assessment Practices in Distance and Online Learning Undergraduate Mathematics in Nigeria. *Journal of Educational Research and Practice*, 10(1), 90-103.
- [15]. Schunk, D. H. (2012). *Learning Theories: An Educational Perspective* (6 ed.). Boston, MA: Pearson Education Inc.
- [16]. Stankous, N., & Buiabas, M. (2018). Math Online: Student's Perspective Based on Survey. *European Scientific Journal*, 14(34), 336-351.
- [17]. Taherdoost, H. (2019). What Is the Best Response Scale for Survey and Questionnaire Design; Review of Different Lengths of Rating Scale / Attitude Scale / Likert Scale. *International Journal of Academic Research in Management (IJARM)*, 1-12.

- [18]. Yen, J. C., & Lee, C. Y. (2011). Exploring problem solving patterns and their impact on learning achievement in a blended learning environment. *Computers & Education*, 56(1), 138-145.
- [19]. Yushau, B., & Khan, M. A. (2014). Students perceptions of online homework in preparatory year pre-calculus courses. *International Journal of Mathematics Trends and Technology*, 8(1), 12-17.

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