



# MATHEMATICS EDUCATION AMIDST THE PANDEMIC: THE EXPERIENCES OF FRESHMEN UNIVERSITY STUDENTS CHALLENGED AT THE MARGIN

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*This phenomenography describes and analyses the experiences of geographically challenged students in learning mathematics during the pandemic. The sample includes six geographically challenged first-year Bachelor of Secondary Education University students in a public State University in the Philippines. Data is collected using a semi-structured interview guide. Data was analysed using phenomenographic data analysis. Results show that the experiences of these geographically challenged students fall within three qualitatively different categories of description. These are new modalities and new mathematics learning experiences, mathematics difficulty vis-à-vis teaching styles and struggling, coping, and persisting. Challenges like personal, financial, technological, instructional, socio-economic, and geographic location persist as they pursue education in the new normal. These students attribute course difficulty in mathematics to pedagogical aspects, teaching approaches of instructors, personally challenging situations, and the inability to blend with the trend. Hence, school administrators may strengthen the quality of mathematics instruction in the university by considering the voices of the marginalised and not just offering a one-size-fits-all policy to make the mathematics curriculum flexible, inclusive, and equitable. This will address the demands and needs of the learners, especially the geographically challenged ones.*

**KEYWORDS:** Pandemic Learning, Geographically Challenged Students, Mathematics Education, Learning Experiences, Phenomenography, Students at the Margin

## INTRODUCTION

For the past years, the majority of the learning process of the students was through classroom settings or face-to-face interaction. Teachers used to deliver

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their lessons through face-to-face lectures, interactive activities, hands-on exercises, and the like. However, the increasing demand for educational transformation caused by the fast-paced technological development was heightened by the COVID-19 pandemic. It has revolutionized instruction from the usual face-to-face interaction to other learning modalities in the new normal, which did not exclude the universities resulting in class suspensions (Adhikari et al., 2020). This has forced institutions, teachers, and students to migrate educational activities online (Crawford et al., 2020; Syauqi et al., 2020). Despite the efforts of the teachers to make learning effective during the pandemic, advantages and challenges with this abrupt transition have been explored widely specifically for mathematics instruction (Carius, 2020; Sabaruddin & Khairunnisak, 2020).

Furthermore, studies on new normal education have found various discrepancies and limitations of the system, particularly on the side of the students including network connection, finances in buying resources like computer and mobile data for online learning (Amir et al., 2020), accessibility and the ability to use ICT equipment (Tanujaya et al., 2021), time management, difficulty to focus while learning online for a longer period, stress which might have an impact on student perspective toward learning (Amir et al., 2020), the environment, and course constraints (Tyaningsih et al., 2020).

Moreover, the challenged or disadvantaged students in terms of geographical and financial limitations were also greatly affected. According to Alipio (2020), low readiness scores were observed among learners in low-income classes and rural areas as to the new normal learning. Carius (2020) conducted a study in a rural school and found that using technology as a strategy to face the problems in mathematics learning amidst the pandemic highlights reflections on the inequality of access to the internet due to its extensive territorial range and multiple specificities.

In these unprecedented changes in the new normal education system, mathematics learning can never be excluded. Kunwar (2020) claimed that one of the underlying reasons for learners' anxiety in mathematics was their negative perception of the subject. During the pandemic, the study of Ariyanti and Santoso (2021) found that the average student's positive response towards mathematics before online learning was greater than after online learning. Mamolo (2022) found that students in the online mode of instruction experienced a significant decrease in their mathematics motivation and self-efficacy while maintaining high anxiety.

However, in this complex phenomenon of new normal learning, the National Council of Mathematics Teachers as cited by Delgado (2020), advances that it is essential to get students to participate in meaningful mathematical discourse. In the Philippines, people used to believe that education is one of

the means to alleviate the economic situation of the family. Unfortunately, during this pandemic time, the great divide between the rich and the poor was exacerbated. As Magsambol (2020) has cited, there is an obvious gap between those who can and cannot afford the resources to avail of the new education platform. [Schoole \(2020\)](#) has challenged the education systems worldwide to take advantage of the COVID-19 outbreak to bridge the gap between the rich and the poor in terms of access to quality education. In this unveiling, the experiences of the geographically challenged students were highlighted in the new normal mathematics education discourse to raise their voices in advancing equitable mathematics education for all.

## RESEARCH QUESTION

This study aimed to describe, understand, and analyse the experiences of geographically challenged students in the pandemic mathematics education and how it would inform the current state of mathematics education.

## REVIEW OF THE LITERATURE

### Mathematics Learning During the Pandemic

The pandemic posed an excellent opportunity to change the way we teach mathematics in schools which needed to be more equitable ([Delgado, 2020](#)). [Tanujaya et al. \(2021\)](#) found out that online mathematics instruction had challenges in terms of technological resources and financial capacity especially those from underdeveloped nations with insufficient infrastructure, in particular ([Simbulan, 2020](#)). [Ariyanti & Santoso \(2020\)](#) in Indonesia on online mathematics learning before and after the pandemic disclosed that students have better learning outcomes and positive attitudes with the former than the latter. However, [Wang et al. \(2022\)](#) in his study in an online undergraduate mathematics course revealed that students improved much more in test performance when using fewer technologies and tools.

### The Case of the Challenged Students at the Margin

While the most vulnerable students might not have access to digital learning resources, several countries offered useful insights into some of the most equitable and inclusive solutions to provide access to digital learning resources and effective distance education (OECD, 2020). Recent studies have demonstrated that students have slower performance growth in test scores in online learning especially those from disadvantaged socio-economic backgrounds ([Andrew et al., 2020](#)). Students from disadvantaged rural areas were not ready for online

learning (Alipio, 2020). Studies found that online learning cannot generate desired results in underdeveloped and developing countries where a vast majority of students are unable to access the internet due to technical, as well as financial issues (Aboagye et al., 2020; Adnan & Anwar, 2020). The impact of technological and technical preparations on the success of teaching through virtual classes in the light of the Covid-19 pandemic confirmed that online education cannot achieve its goals in poor countries (Adnan & Anwar, 2020), in which it was difficult for the citizens to access the internet, due to technical and financial problems, as was the case in the Philippines.

Moreover, Gocotano et al. (2021) found that higher education students in rural areas during the pandemic were challenged in all aspects of learning including the resources needed. The country reported multiple students and instructors who need to climb mountains and trees to access the internet (Averia, 2020). The Philippines' sluggish internet connection provided a significant barrier to students, particularly those from rural areas or remote places (Adonis, 2020). Learners in rural locations have significant hurdles in adjusting to modern lifestyles and learning, as seen by the extensive use of online learning management systems and low-technological applications (Dube, 2020).

## RESEARCH METHODOLOGY

Phenomenography was employed as a method to explore the qualitative ways in which a group of people (i.e., geographically challenged students) experience a specific phenomenon, in this case, mathematics learning experiences in the new normal. Marton (1986) defines phenomenography as "a research method for mapping the qualitatively different ways in which people experience, conceptualize, perceive, and understand various aspects of, phenomena in, the world around them" (p. 31).

## SAMPLE OF THE STUDY

The participants of the study were six geographically challenged first-year university students at a public state university in the Western Visayas region in the Philippines who have taken Mathematics in the Modern World (MMW) during the second semester A.Y. 2020-2021 amidst the pandemic. These students were taking Bachelor of Secondary Education with specialization in English (1), Science (3), and Mathematics (2). Polkinghorne (1989) recommended that researchers must interview from 5 to 25 individuals who have all experienced the phenomenon. The number of participants depends on the qualitative research approach. These students were taking Bachelor of Secondary Education (BSED) at the said university and were chosen

using purposive sampling and snowball sampling methods. The inclusion criteria included the following: a) geographically isolated students (living in mountainous areas, lowland but remote, etc.) based on their demographic data in university records or peer/teacher referral; b) financially struggling students (family income less than 10,957 monthly based on the updated thresholds for the seven income groups and three income classes) proposed by [Albert et al. \(2018\)](#) using the poverty data available from the PSA for 2018); and c) students who could hardly participate or attend online classes due to geographic limitation and network problems based on the records of the teacher and their accounts.

## RESEARCH INSTRUMENT

The semi-structured interview guide was composed of a set of pre-defined interview questions as well as the information emerging from participants' responses. This is one of the most popular data collection methods in phenomenography ([Stenfors-Hayes et al., 2013](#)). These questions helped the researcher to explore the mathematics learning experiences of the geographically challenged students in the new normal.

The questions were divided into two parts: (1) Establishing Rapport and (2) Mathematics Learning Experiences in the New Normal. Three experts evaluated the appropriateness and validity of the questions included in the semi-structured interview guide. These experts specialized in the fields of research, education, and language to ensure the accuracy of the questions included in the guide. In addition, the semi-structured interview guide was pilot-tested on some first-year college students by conducting informal interviews regarding their new normal mathematics learning experiences.

## DATA GATHERING PROCEDURE AND ANALYSIS

The goal of the researcher was to investigate the mathematics learning experiences of geographically challenged students in the new normal. A semi-structured in-depth interview was conducted with the six purposively selected geographically challenged students based on the inclusion criteria. The interview schedule was followed by interviews with the geographically challenged students.

In addition, to have a detailed, thick, and in-depth understanding of their experiences, the researcher conducted face-to-face and online follow-up interviews per student participant. Specifically, after the face-to-face interview at the agreed place (school campus) and time, follow-up open-ended questions were asked by the researcher through chats via Messenger. Students answered

the questions via chat and messenger call. According to [Han and Ellis \(2019\)](#), using both semi-structured interviews and open-ended questionnaires to collect data is often favoured. After the data saturation was attained and the research question was already answered, the researcher proceeded to the analysis.

In analysing the mathematics learning experiences of geographically challenged students in the new normal and describing the categories of variations on their individual experiences, this study employed the phenomenographic data analysis process of Dahlgren and Fallsberg (1991) and McCosker et al. (2004) as cited by [Han and Ellis \(2019\)](#) composed of the following stages: Familiarization; Condensation; Comparison, grouping, and articulating; and Labelling and contrasting.

Reliability and trustworthiness of the data were ensured through member checking wherein the participants were allowed to browse the interview transcripts and results of the analysis to confirm whether these concurred with what they wanted to convey to the researcher during the interview.

## RESULTS AND DISCUSSION

After reading and analysing the transcripts from the in-depth interviews with the six participants on their experiences in new normal mathematics education, the researcher came up with these three qualitatively different categories of their experiences: (1) new modality, new mathematics learning experience; (2) mathematics difficulty vis-à-vis teaching styles; and (3) struggling, coping, and persisting. These categories of description of the participants map to the varied ways in which they experience, perceive, conceptualize, and understand the new normal mathematics education phenomenon during the pandemic. S1 to S6 represent the student participants in the study.

### **New Modality, New Mathematics Learning Experience**

The Covid-19 pandemic brought about drastic changes in the lives of the students. It has revolutionized instruction from the usual face-to-face learning to different learning modalities (e.g., e-learning, online learning, modular learning, blended learning, flexible learning, etc.) including mathematics education. This abrupt shift of learning modalities has spawned various experiences on the part of the students amidst the pandemic. During the pandemic, students struggle in their studies due to several factors which have affected their lives. The abrupt shift to new normal learning has drastically affected students from the disadvantaged sectors.

Due to the demand of the situation and to assist students in coping with the

new trend, universities opted to implement various flexible learning modalities (Crawford et al., 2020; Syauqi et al., 2020). As what S1 had experienced:

*Our learning modality is usually online and sometimes modular. We didn't meet online through Zoom and Google Meet. Our teacher seldom discussed, and just asked us in the group chat if we had questions.*

In addition, students also experienced learning mathematics through YouTube videos and PowerPoint presentations (PPTs) sent by their instructors. Research on YouTube-based mathematics learning shows that teacher-created videos uploaded on YouTube are indeed effective means of helping students maximize mathematics learning opportunities online in the new normal. The flexible, personalized, and student-friendly features of the videos suit the students' need for comprehensive, efficient, and accessible learning materials during the pandemic Nabayra (2022b). However, some students couldn't open the video files, hence resorted to other means like screen recording the videos or taking screenshots as shared by these students. S2 cited that,

*Our teacher would send us a video link from YouTube and would discuss. I would watch that video but sometimes I was incapable of doing it and would just request a screenshot of the video from my classmates so that I could print the topic after. We submitted our answers to the quiz through Google Forms right after class discussion. After the discussion, there was a quiz. There were no Google Meet and Zoom meetings.*

Furthermore, aside from asynchronous and synchronous online learning experiences, some of the participants also learned through online modules in the form of PDFs paired with supplementary online real-time discussions, Facebook groups, and messenger group chat discussions which are still being used today by some mathematics instructors in the post-pandemic world. Urbano (2022) advanced that the use of Facebook social learning groups is a good platform for conducting classes during this time of pandemic. However, some circumstances won't permit students to attend these modalities like what S3 has disclosed.

*Our learning modality was online such as the PDF modules provided and sometimes our teacher would discuss through Google Meet which I didn't attend to. Our teacher would also asynchronously discuss through our group chat. She would ask us questions and send us pictures, examples, and activities. My cousin's house is far away. That's why I only attended our online classes once a day because no one would also take care of my baby.*

The sudden shift of instruction from face-to-face to other flexible learning modalities like online learning caught the teachers and students unprepared, that is, no one was ready for these unprecedented changes in the education system. College students in some universities in the Philippines were least prepared for the new normal education (Guansi et al., 2020). For college stu-

dents, only online learning readiness showed a significant positive relationship with online academic performance. It demonstrates that being ready to study online and having high emotional competence could make adolescents more resilient toward COVID-19-related challenges and help them to succeed in online learning (Wang et al., 2022). Hence, students' resources, technological skills, financial status, and skills for independent learning must be considered in online learning. However, to sustain education and continue the teaching and learning process, various modalities were employed by different institutions and teachers as well.

In the field of mathematics education, different instructors adopt different modalities and approaches depending on their knowledge, capabilities, and available resources. However, not all these modalities work well for all types of students highlighting the experiences of the marginalized, geographically challenged, and financially struggling students. Despite the efforts of the teachers to make learning effective during the pandemic, advantages and challenges with this abrupt transition have been explored widely specifically for mathematics instruction (Carius, 2020). However, despite its multiple advantages, there are quite a few limitations of e-learning such as social isolation, face-to-face interaction between teacher and student, connectivity issues, and more (Sá & Serpa, 2020).

Hence, new learning experiences arose from these first-hand encounters of how it was to learn mathematics in the new normal. Experiences like screen recording and taking screenshots to be at the same pace as their classmates, beating the dues on Google form quizzes, connectivity issues, borrowed mobile phones, and ambiguous discussions were all contributing to their perceptions of mathematics learning in the new normal. Despite the limiting circumstances that these students have, they were still able to make it through these hard times of learning.

### **Mathematics Difficulty vis-à-vis Teaching Styles**

Teaching and learning still went on during the pandemic despite the disruption of actual face-to-face classes. The difficulty of mathematics courses as perceived by students even before the pandemic was exacerbated by the system where almost everything was done online. Even before the pandemic, most students perceive mathematics as a difficult subject. Kunwar (2020) claimed that one of the underlying reasons for learners' anxiety in mathematics was their negative perception of the subject. In addition to this, the teaching styles of the instructors handling mathematics courses were also contributory to students' views of mathematics learning during the pandemic.

However, despite the plethora of teaching styles, approaches, and strate-

gies utilized by mathematics teachers, students still find the course difficult considering various accounts and circumstances. The freshmen students' perception of mathematics learning in the new normal exemplified the expectations and viewpoints of typical students in a rural state university who considered new normal learning as challenging. As revealed by their responses, this point of view was influenced by their previous negative experiences of mathematics learning in the pre-pandemic era and their anxiety and fear of the subject [Nabayra \(2022a\)](#).

S4 shared that mathematics is difficult to understand given that discussions were also incomprehensible.

*Math is very complex, plus, the discussion is incomprehensible. I just asked for clarifications from my classmates and cousin for me to answer the activity.*

They further added that hasty discussions, rushed activities, pure English discussions, and inability to catch up with the fast-paced lessons ended up in examination failures.

*S1: Our teacher is as if she is in haste when discussing, and we are rushed with the activities, as well. We could not catch up with the lessons and we ended up failing the exams...*

This was also confirmed by S5 where rushed dues and late submissions were problematic since connectivity issues persisted during that time. She needed to find good connections to beat the deadlines. She narrated that,

*If our teacher sends an activity after discussion, she wants us to pass it right away within the day. If I am at the hill, there is no table, only my feet as my desk, I write while glancing at the cellular phone to answer the activity and adjust to full brightness when it is too bright.*

The inability to attend classes left students directionless and pointless on what to do in that course. Hence, teaching styles which include understanding students' varied learning agencies and backgrounds, were also factors why students find mathematics difficult amidst the pandemic. It's difficult for teachers to teach math in an online or even flexible learning environment with limited personal communication unlike in personal face-to-face interaction. Although the digitization of mathematics lessons seems to have been normalized, difficulties persist ([Barlovits et al., 2021](#)).

*S5: If always active, you would understand. Online discussion without face-to-face classes is so difficult. You do not have someone to ask on how to answer this and that. That is why it is still given an amount of time to have a better understanding amidst its difficulty.*

Anent to that, some participants also narrated that examples and illustrations weren't so elaborate making topics hard to comprehend. Asking ques-

tions seems to be uncomfortable because a message template should be followed but still no response was received from the instructors. This conforms to what Mamolo (2022) has concluded that learners may find it hard to ask the teachers or their classmates if they have difficulty with the topic since all revolve around a virtual environment. In S5's account,

*We discussed lessons through Facebook Messenger. Our teacher didn't provide examples. If we wanted to ask her about something and be responded to, we must formally do it by using her template. Sometimes, our messages would either get seen zoned or not replied to. There were no examples in her discussion.*

The difficulty of mathematics learning during the pandemic was contingent on various factors as shared by the students in the geographically challenged areas. Mathematics is inherently difficult as viewed by most students which causes mathematical anxiety due to various factors (Fernandez, 2018), and the pandemic crisis has worsened this viewpoint for disadvantaged students considering its impact on their performance, studies, and lives. It coheres with the study of Mamolo (2022) who found that students in the online mode of instruction got a significant decrease in their mathematics motivation and self-efficacy while maintaining high anxiety. It agrees with what Ariyanti & Santoso (2020) have found that the average student's positive response towards mathematics before online learning is greater than after online learning.

Teaching styles, strategies, and approaches utilized by mathematics instructors during this time of the pandemic crisis were also instrumental to how these kinds of students perceived mathematics learning in the new normal. That's why learning institutions must focus on developing the competencies of the teachers to teach online including instructional material development skills (Syauqi et al., 2020). It was highlighted that incomprehensive and hasty discussions, rushed activity dues, few examples and illustrations to the discussed topics, and limited interactions and communication among teachers and students were some of the factors identified by the students to which they attribute their low performance and grades in the course. This confirms the study of Irfan et al. (2020) who examined the challenges faced by lecturers when implementing e-learning during the pandemic. Many obstacles are faced, one of which is the availability of features in the academic portals of each tertiary institution, the limited interaction between lecturers and students, and limitations in writing mathematical symbols. Flexible online learning has limited teacher and student interactions and connections in learning activities with peers (Shore, 2020). In addition, the learning resources, and materials that the instructors are providing to the students were not suited for all because different students have different learning agencies and capabilities to learn given the constraints brought by the pandemic. Koul et al. (2018) stressed that a lack of learning resources affects the quality of teaching. Teachers

rely heavily on resources provided as they give them confidence in engaging with their students. This follows that teachers need instructional materials furnished with instructions to better teach the subject.

### **Struggling, Coping, and Persisting**

The pandemic has crippled several aspects of society including the education sector. It has affected students in all facets of life, especially the geographically and financially challenged students. Different aspects of their lives were extremely trodden resulting in difficulties and struggles in learning amidst the crisis. Various circumstances of students coming from disadvantaged areas including geographic location, technological knowledge and resources, economic capabilities, personal preparedness, educational resources/materials, and other barriers affected their schooling during the pandemic. [Bringula et al. \(2021\)](#) also advanced that students faced technological, personal, domestic, assessment, pedagogical, consultation, and test anxiety challenges which affected their mathematics self-concept. These struggles forced them to find ways for them to still thrive in the new normal and pursue their education despite the bludgeoning of adversities.

Among all the major struggles of these students in the new normal mathematics education, the unavailability, instability, and fluctuation of internet connection and network signal was the most common experience among them. In connection with this, storage problems of their mobile phones also persist due to the overload of materials and resources sent to them by their instructors. Consequently, these also affected their financial resources because of the need to buy mobile data, load for internet connection, and the worst part is to travel to the mountains, hills, rivers, and remote barangays just to access good signals. S5 shared that,

*It is hard to access when it comes to network signals. It would take 20-30 minutes from our house to chance upon an area that has a signal. I walked, it was a hill, and it would take 20-30 minutes to walk along, it was so difficult especially when it rained and would become very slippery... sometimes, I went there alone, to a small hut where the signal area was, and get drenched when it rains.*

The road towards the area having a signal is too narrow for people to walk on. The experience of S5 was burdensome. She also needed to wake up early and go home usually at dusk just to attend her classes.

*Yes, I get up at 5:00 A.M. or 5:30 A.M., cook breakfast along with lunch, and bring the food there. Then, I go home at around 5:00 P.M. or 5:30 P.M. and get home at 6:30 P.M. It is not safe because I am alone. There was so much rustling around and I could not tell if something or someone was coming at me.*

In addition, a similar scenario was experienced by S6 in terms of struggling connection and the need to travel to the next barangay just to access the materials sent by their teachers. It agrees with the study of [Carius \(2020\)](#) conducted in a rural school which found that using technology as a strategy to face the problems of mathematics learning amidst the pandemic highlights reflections on the inequality of access to the internet due to its extensive territorial range and multiple specificities.

*S6: My pandemic experience in Loctuga was rough. There were times when we had an activity in MMW and we weren't able to go near an area with a signal. Our remedy for that was, before the deadline, we would make sure that we could go to a specific area and wait for the message to be sent. The signal was completely poor, and we had to go to the next barangay to get a good signal. It would take up a lot of time especially when it's bad weather, our studies were affected. It is indeed difficult.*

Aside from signal strength, participants also struggled with their phone storage due to the limited capacity of their mobile phones and gadgets. S4 explained that:

*S4: I have problems with my signal strength, as well as my phone storage because it was already full. My phone had never been replaced since the first year and I had no laptop as well, the reason why I didn't have enough storage.*

To add more to the experiences that the participants underwent during the new normal mathematics instruction and online learning were the gadgets and mobile phones they were using. It's either the phone was borrowed, an old model or a unit was not functioning well. Possession of facilities or equipment for online learning and the capability to assess and use technology were factors included for online learning readiness from the perspective of university education students ([Kamaruzaman et al., 2021](#)).

Recalling S6's story,

*My first year was online learning. My phone at that time was a touchscreen but was bought on a low budget. That's why it has defects. It had a hard time sending files or converting the activity to a document which urged me to borrow a phone from a friend and I was able to pull it through. In my second year, I got a new phone.*

With the same story, S1 also had an experience of a borrowed phone from her sibling who would need it most of the time for other purposes. Hence, S1 couldn't always go online due to limited resources, and they couldn't purchase a new cell phone unit because of financial difficulty.

*It was too hard for me to learn Math during the pandemic knowing that I didn't like the course. Also, I couldn't understand the lessons maybe because I didn't go online most of the time since I only borrowed my sibling's phone. I downloaded our activities and lectures on the phone but sometimes, my sibling would need her phone*

*for immediate purposes, the reason why I didn't get to access my academic work often.*

Despite all these struggles and challenges in the new normal, students just kept on and never gave up. Although there were times/moments of thoughts on giving up, foresight of the future encouraged them not to falter. Success waits for those who don't give up as they say. Their family and current situation motivated them to pursue education despite the pandemic.

As S6 expressed that,

*Yes, there were times that I thought of giving up. I told myself, "I thought of giving up. I am giving up because I'm too tired of the situation I am in." And if it's just the same situation I always face, then I thought of quitting studying.*

She would always remember her parents and their sufferings which inspired her to hustle and strive more.

*But every time I saw my parents struggling as well, I thought to continue studying despite the difficulties. I will endure everything and persevere to overcome all the challenges I face.*

Hardship is never a hindrance to success. The experiences of these geographically challenged students in the new normal mathematics education also reveal their struggles, how they cope with these challenges, and how they found the driving force to pursue and persist despite the adversities. These are indeed incomparable to other students' experiences since the realities of these geographically challenged students were a struggle given the scarcity of their available resources even before the pandemic and the challenges brought by the crisis worsened the situation. These barriers are further aggravated by the students' difficulty adjusting their learning styles, performing other responsibilities at home, and poor communication between educators and learners (Baticulon et al., 2020).

From one struggle to another, students never ran out of ways to cope with these struggles, a natural trait of a Filipino facing challenges, persistent and determined. The struggles with unstable connection, storage problems in mobile phones, financial resources to buy load for mobile data, and the need to traverse mountains, hills, or to another adjacent barangay just to have a good connection were the most common among these students. With these challenges, some of them had no idea whether examinations were at hand, or submission dues and others couldn't go online because of the lack of gadgets available for online learning. Technological know-how was also a struggle given that these students' technological literacy was not at par with students at the centre. Soriano et al. (2022) studied public university students in the Philippines and found that students' preparedness level was poor, indicating that students are not fully equipped or ready for online learning. Concurrently, Alipio (2020) has also shown that rural students in low-income

families have low preparedness for new normal learning and a state university is a public rural school where most of the students live in the challenged areas.

However, a determined person under the bludgeoning of challenges and pressure would not easily succumb to the obstacles of life. These students have their unique ways of coping with the challenges of online learning. This agrees with what [Hettiarachchi et al. \(2021\)](#) have reported that motivation, challenges, and interaction influence online learning satisfaction wherein motivation was the most influential factor under self-regulated learning.

## CONCLUSIONS AND RECOMMENDATIONS

Students from geographically challenged areas have varied experiences during the new normal mathematics education. The realities of their existing situations, financially struggling and situated in remote areas, were already a challenge in their everyday lives. This was even aggravated by the unforeseen turn of events during the pandemic where everything went online resulting in new experiences, modalities, struggles, difficulties, and stories. Challenges like personal, financial, technological, instructional, socio-economic, and geographic location persisted as they pursued education in the new normal. Zooming in, these students attribute course difficulties specifically in mathematics to pedagogical aspects, teaching approaches of their instructors, personal challenging situations, and the inability to blend with the trend. On the brighter side, despite their limiting situations, the geographically challenged students never succumbed to the challenges of the new normal education. Most importantly, the trying times during the pandemic helped them build their formidable character and positive attitude to persevere despite the crisis.

Hence, school administrators, specifically those in higher education institutions, may strengthen the quality of mathematics instruction in the university by considering the voices of the marginalized and not just offering a one-size-fits-all policy. The school can tap the curriculum planners and designers of the institution to plan training, workshops, and seminars for educators, especially in the integration of technology in teaching models through an innovative strategy and instructional material to cater for the needs of 21st-century learners. Policymakers and curriculum planners may investigate possible ways to make mathematics curriculum and instructional materials design flexible, inclusive, and equitable with the use of technology and other modern innovations that may be investigated to address the demands and needs of the learners especially the geographically challenged students in the new normal.

In addition, other researchers may also investigate the experiences of other groups of students aside from the geographical challenges to highlight their

voices in mathematical discourses in education.

## REFERENCES

- Aboagye, E., Yawson, J., & Appiah, K. (2020). COVID-19 and e-learning: The challenges of students in tertiary institutions. *Social Education Research, 2*(1), 1-8. Retrieved from <https://ojs.wiserpub.com/index.php/SER/article/view/ser.212021422>
- Adnan, M., & Anwar, K. (2020). Online learning amid the COVID-19 pandemic: Students' perspectives. *Journal of Pedagogical Sociology and Psychology, 2*(1), 45-51. Retrieved from <https://eric.ed.gov/?id=ED606496>
- Adonis, M. (2020). *Challenges hound online opening classes*. Retrieved from <https://newsinfo.inquirer.net/1344074/challenges-hound-online-opening-of-classes>
- Albert, J. R. G., Santos, G. F., & Vizmanos, J. F. V. (2018). *Profile and determinants of the middle-income class in the philippines*. Quezon City, Philippines: Philippine Institute for Development Studies. Retrieved from <https://pidswebs.pids.gov.ph/CDN/PUBLICATIONS/pidsdps1820.pdf>
- Alipio, M. (2020). *Education during the covid-19 era: Are learners in a less-economically developed country ready for e-learning?* Kiel, Hamburg: Leibniz Information Centre for Economics. Retrieved from <http://hdl.handle.net/10419/216098>
- Amir, L., Tanti, I., Maharani, D., Wimardhani, Y., Julia, V., Sulijaya, B., & Puspitawati, R. (2020). Student perspective of classroom and distance learning during the COVID-19 pandemic in the undergraduate dental study program Universitas Indonesia. *BMC Medical Education*. <https://doi.org/10.1186/s12909-020-02312-0>
- Andrew, A., Cattan, S., Dias, M., Farquharson, C., Kraftman, L., Krutikova, S., ... Sevilla, A. (2020). Inequalities in children's experiences of home learning during the COVID-19 lockdown in England. *Fiscal Studies, 41*(3), 653-683. <https://doi.org/10.1111/1475-5890.12240>
- Averia, L. (2020). *Security challenges in the online learning environment*. Retrieved from <https://www.manilatimes.net/2020/10/07/opinion/columnists/topanalysis/security-challenges-in-the-online-learning-environment/777325/>
- Barlovits, S., Jablonski, S., Lázaro, C., Ludwig, M., & Recio, T. (2021). Teaching from a distance-math lessons during COVID-19 in Germany and Spain. *Educ. Sci*(406), 11-11. <https://doi.org/10.3390/educsci11080406>
- Baticulon, R., Sy, J., Alberto, N., Baron, M., Mabulay, R., Rizada, L., ... Reyes, J. (2020). Barriers to online learning in

- the time of COVID-19: A national survey of medical students in the Philippines. *Medical Science Educator*, 31, 615-626. <https://doi.org/10.1101/2020.07.16.20155747>
- Bringula, R., Reguyal, J. J., Tan, D. D., & Ulfa, S. (2021). Mathematics self-concept and challenges of learners in an online learning environment during COVID-19 pandemic. *Smart Learn. Environ*, 8(22). <https://doi.org/10.1186/s40561-021-00168-5>
- Carius, A. (2020). Teaching practices in mathematics during COVID-19 pandemic: Challenges for technological inclusion in a rural Brazilian school. *American Scientific Research Journal for Engineering*, 72(1). Retrieved from [https://asrjetsjournal.org/index.php/American\\_Scientific\\_Journal/article/view/6230/2232](https://asrjetsjournal.org/index.php/American_Scientific_Journal/article/view/6230/2232)
- Crawford, J., Henderson, K., Rudolph, J., Malkawi, B., Glowatz, M., Burton, R., ... Lam, S. (2020). COVID-19: 20 countries' higher education intra-period digital pedagogy responses. *Journal of Applied Learning & Teaching*, 3(1), 1-20. <https://doi.org/10.37074/jalt.2020.3.1.7>
- Delgado, P. (2020). *The teaching of mathematics requires urgent restructuring*. Retrieved from <https://observatory.tec.mx/edu-news/mathematics-requires-restructuring>
- Dube, B. (2020). Rural online learning in the context of COVID-19 in South Africa: Evoking an inclusive education approach. *Multidisciplinary Journal of Educational Research*, 10(2), 135-157. <https://doi.org/10.4471/remie.2020.5607>
- Fernandez, G. M. (2018). *Math anxiety and development of an instructional material to improve performance in mathematics*. Unpublished Masters Thesis. Aklan State University, Banga, Aklan, Philippines.
- Gocotano, T., Jerodiaz, M., Banggay, J., Nasibog, H., & Go, M. (2021). Higher Education students' challenges on flexible online learning implementation in the rural areas: A Philippine case. *International Journal of Learning, Teaching and Educational Research*, 20(7), 262-290. <https://doi.org/10.26803/ijlter.20.7.15>
- Guansi, G., Pal-Ec, B., & Orasing, G. (2020). Readiness of students in the new normal learning: An assessment in Baguio City and Benguet Province. *American Journal of Engineering Research (AJER)*, 9(12), 107-117. Retrieved from <http://www.ajer.org/papers/Vol-9-issue-12/M0912107117.pdf>
- Han, F., & Ellis, R. (2019). Using Phenomenography to Tackle Key Challenges in Science Education. *Front. Psychol*, 10, 1414. <https://doi.org/10.3389/fpsyg.2019.01414>
- Hettiarachchi, S., Damayanthi, B., Heenkenda, S., Dissanayake, D., Ranagalage, M., & Ananda, L. (2021). Student satisfaction with online learning during the COVID-19 pandemic: A study at state universities in Sri Lanka. *Sustainability*, 13(21), 11749.

<https://doi.org/10.3390/su132111749>

- Irfan, M., Kusumaningrum, B., Yulia, Y., & Widodo, S. A. (2020). Challenges during the pandemic: Use of e-learning in mathematics learning in higher education. *Infinity*, 9(2), 147-158. <https://doi.org/10.22460/infinity.v9i2.p147-158>
- Kamaruzaman, F. M., Sulaiman, N. A., & Shaid, N. A. N. (2021). A Study on perception of students' readiness towards online learning during covid-19 pandemic. *International Journal of Academic Research in Business and Social Sciences*, 11(7), 1536-1548. <https://doi.org/10.6007/IJARBS/v11-i7/10488>
- Koul, R., Fraser, B. J., & Nastiti, H. (2018). Transdisciplinary instruction: Implementing and evaluating a Primary- School STEM teaching model. *International Journal of Innovation in Science and Mathematics Education*, 26(8), 17-29. Retrieved from <https://openjournals.library.sydney.edu.au/CAL/article/view/13189>
- Kunwar, R. (2020). Mathematics phobia: Causes, symptoms, and ways to overcome. *International Journal of Creative Research Thoughts (IJCRT)*, 8(8), 818-822. Retrieved from <http://www.ijcrt.org/papers/IJCRT2008103.pdf>
- Mamolo, L. (2022). Online learning and students' mathematics motivation, self-efficacy, and anxiety in the "new normal. *Education Research International*, 2022. <https://doi.org/10.1155/2022/9439634>
- Marton, F. (1986). Phenomenography: A research approach to investigating different understandings of reality. *Journal of Thought*, 21(3), 28-49. Retrieved from <http://www.jstor.org/stable/42589189>
- Nabayra, J. (2022a). Least mastered topics in mathematics and freshmen students' perception of mathematics learning in the new normal from a state university in the Philippines. *Journal of Positive School Psychology*, 6(6).
- Nabayra, J. (2022b). YouTube-based teacher-created videos for online mathematics learning during the pandemic and its effect on students' mathematics performance. *Webology*, 19(2). Retrieved from <https://www.webology.org/abstract.php?id=1320>
- Polkinghorne, D. E. (1989). Phenomenological research methods. In R. S. Valle & S. Halling (Eds.), *Existential-phenomenological perspectives in psychology* (p. 41-60). New York: Plenum.
- Sá, M. J., & Serpa, S. (2020). The COVID-19 pandemic as an opportunity to foster the sustainable development of teaching in higher education. *Sustainability*, 12, 8525.
- Sabaruddin, M., & Khairunnisak. (2020). Pandemic Covid-19: The opportunities and challenges to using ICT in mathematics learning. *International Journal of Entrepreneurship and Business Development*, 3(4), 409-414. <https://doi.org/10.29138/ijebd.v3i4.1201>

- Sehoole, C. (2020). *Marching on to a new way of learning and working* (Vol. 14). Retrieved from [https://www.up.ac.za/media/shared/6/ZP\\_Files/up-education-in-tuition-april-2020-web.zp191180.pdf](https://www.up.ac.za/media/shared/6/ZP_Files/up-education-in-tuition-april-2020-web.zp191180.pdf)
- Shore, J. (2020). *Problems in online classes*. Retrieved from <https://file:///C:/Users/julie/Desktop/research%20example.pdfeducation.seattlepi.com/problems-online-classes-1132.html>
- Simbulan, N. (2020). COVID-19 and its impact on higher education in the Philippines. *Higher Education in Southeast Asia and Beyond*, 8, 15-18. Retrieved from [https://headfoundation.org/wp-content/uploads/2020/11/HESB-8COVID19\\_2020.pdf](https://headfoundation.org/wp-content/uploads/2020/11/HESB-8COVID19_2020.pdf)
- Soriano, R., Cagurangan, P., & Escario, C. (2022). Exploring students' readiness in online learning in the new normal. *Asia Proceedings of Social Sciences*, 9(1), 217-218. <https://doi.org/10.31580/apss.v9i1.2299>
- Stenfors-Hayes, T., Hult, H., & Dahlgren, M. (2013). A phenomenographic approach to research in medical education. *Med. Educ*, 47, 261-270. <https://doi.org/10.1111/medu.12101>
- Syauqi, K., Munadi, S., & Triyono, M. (2020). Students' perceptions toward vocational education on online learning during the COVID-19 pandemic. *International Journal of Evaluation and Research in Education (IJERE)*, 9(4), 881-886. <https://doi.org/10.11591/ijere.v9i4.20766>
- Tanujaya, B., Prahmana, R., & Mumu, J. (2021). The mathematics instruction in rural area during the pandemic era: Problems and solutions. *Mathematics Teaching Research Journal*, 13(1), 3-15. Retrieved from <https://commons.hostos.cuny.edu/mtrj/wp-content/uploads/sites/30/2021/04/v13n1-The-Mathematics-Instruction-in-Rural-Area.pdf>
- Tyaningsih, R., Arjudin, Prayitno, S., Jatmiko, Handayani, A., et al. (2020). The impact of the COVID-19 pandemic on mathematics learning in higher education during learning from home (LFH): Students' views for the new normal. *Journal of Physics: Conference Series*. <https://doi.org/10.1088/1742-6596/1806/1/012119>
- Urbano, J. M. (2022). Facebook social learning group (FBSLG) as a classroom learning management tool. *Universal Journal of Educational Research*, 1(2), 1-9. Retrieved from <https://philpapers.org/archive/URBFSL.pdf>
- Wang, Y., Xia, M., Guo, W., Xu, F., & Zhao, Y. (2022). Academic performance under COVID-19: The role of online learning readiness and emotional competence. *Current Psychology*. <https://doi.org/10.1007/s12144-022-02699-7>