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Flexible Learning in Action: The Readiness of State Universities and Colleges Teachers and Students to Flexible Learning

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ABSTRACT
The study examined the readiness of teachers and students in Isabela State University, Philippines, for flexible learning in Mathematics due to the COVID-19 pandemic. It utilized quantitative analysis and found that while teachers were proficient in mathematical content and pedagogical knowledge for teaching, they lacked understanding of connecting math to other disciplines and detecting faulty student understanding. Students were deep approach learners but deficient in seeking meaning before analyzing a problem. Both teachers and students were moderately ready for flexible learning, but teachers believed it would result in low-quality learning experiences. Recommendations include improving teacher training in connecting math to other disciplines and detecting faulty understanding, improving time management and location for teaching, and encouraging collaborative and critical thinking among students. The results may be applied to a quality-assured module and instructional videos for flexible learning.

Keywords: Flexible learning, pedagogy, quantitative analysis

INTRODUCTION

Higher education institutions around the world have been challenged to continue teaching and learning beyond the traditional face-to-face instruction due to the threat of the Coronavirus Disease (COVID-19) pandemic in 2019. They have had to reconsider how to create and provide educational materials to students, with an emphasis on finding new strategies to uphold the quality of learning. For these reasons, creative learning methods were investigated to support the transition from traditional to flexible modes of teaching (CMO No. 4, Series 2020). Additionally, novel approaches were sought to enhance the learning environment and delivery design (Tang & Chaw, 2013).

The Commission on Higher Education Chairperson Prospero de Vera mentioned during an April 30, 2020 virtual meeting of the House Committee on Higher and Technical Education that adopting flexible learning using digital and non-digital technology is a more practical solution in light of the coronavirus threat. Consequently, CHED promulgated and implemented the flexible learning guidelines through public and private HEIs (CHED Memo 4, Series 2020).

Flexible learning is a learning modality that places emphasis on program design and delivery, courses, and learning interventions that cater to the unique needs of learners in terms of pace, places, process, and products of learning. The Chairperson of the Commission on Higher Education (CHED) highlighted that the correct term for flexible learning should not be limited to online learning since it does not necessarily require connectivity, especially the internet. This allows students to become independent learners who can study at their own time and place. Garrison and Anderson (2003) also viewed this type of learning as one that offers a student-centered, self-paced, flexible, and multifaceted approach to the learning and teaching process, creating the right combination of the learning environment to enhance the learning experience. Moreover, flexible learning can help students develop vital skills and the ability to use digital technologies for a range of purposes (Hasbun et al., 2015). However, despite its possibilities, the main question remains on how ready students are for flexible learning since they may struggle to adapt to the shift from traditional classrooms to virtual classrooms (Sanchez-Gordon & Luján-Mora, 2014) and may lack computer literacy skills and motivation (Garrison & Anderson, 2003). Additionally, HEIs may lack the necessary facilities and amenities, such as high-speed internet connections (Panyajamorn et al., 2018).

In his book, "Outcomes-Based Education (OBE)," Spady (1994) emphasizes the importance of aligning the curriculum, instruction, and assessment planning and implementation with targeted outcomes to improve the existing educational system. He defines OBE as a way of thinking that organizes a school's entire program and instructional efforts around the clearly defined outcomes that students should demonstrate upon graduation. The Southwest Educational Development Laboratory (SEDL, 2005) adds that aligning curriculum, instruction, and assessment with standards is essential to achieve clearly defined learning goals and to strengthen and improve an educational program. Failure to align these components could result in lower student achievement. Furthermore, by analyzing learning competencies and instructional practices in educational institutions, education policymakers and leaders can develop or refine the educational system at the national and district levels (Martone & Sireci, 2009).

It is possible for Outcomes-Based Learning to make flexible learning achievable in terms of outputs and observable transformations of students through the various concepts, theories, and information that higher education institutions can provide. This is in line with CHED's assertion that flexible learning is a part of the educational system, especially in the current situation of the country. With OBE, CHED's goals and objectives can still be achieved even if learners are in their respective residences as long as they have access to learning materials. Moreover, Information and Communication Technology (ICT) provides significant standards in the Teacher Education Curriculum. Online classes are also used as part of distance learning, and the ICT standards guide the instruction of teachers in conducting such classes.

It is important to note that these approaches to studying are not fixed traits of individual students, but rather they can be influenced by various factors, such as the learning environment and instructional strategies used by the teacher. Hence, it is crucial for teachers to understand and recognize the different approaches to studying and employ teaching strategies that can encourage deep learning among students. In a flexible learning environment, it may also be necessary for teachers to provide support and guidance to students to ensure that they are able to adopt effective learning strategies and achieve the desired learning outcomes. Additionally, it may be helpful to provide students with opportunities for self-reflection and assessment of their own learning approaches, and to provide feedback to students on how they can improve their learning strategies. By understanding and addressing the different approaches to studying, teachers can facilitate a more effective and meaningful learning experience for their students in a flexible learning environment.

Teacher knowledge is indeed crucial in ensuring effective mathematics instruction and quality of learning. According to Shulman (1986), teachers need to have both mathematical content knowledge and pedagogical content knowledge to construct mathematical concepts in students' minds effectively. Teachers who have a deep understanding of a subject area can help students to develop a better understanding of the subject. Moreover, Ball (2000) expanded the idea of content-specific knowledge for teaching in mathematics education, emphasizing the importance of both mathematical content knowledge and pedagogical knowledge.

It is also important to note that teachers need to be able to transform content into a representative form that students can understand. Muhtadi, Wahyudin, Kartasasmita, and Prahmana (2018) found that teachers need to have the knowledge and skills to represent mathematical concepts in various ways to help students develop their competence. Teachers who can represent mathematical concepts in different ways can cater to different learning styles and preferences of their students, leading to more effective mathematics instruction and learning outcomes.

Face to Face Learning, Flexible Learning, Blended Learning, Distance Learning, Online Learning, E-learning, and Virtual Learning

The Glossary of Education Reform defines Face-to-face learning or in-person learning as any in-person and in real-time sort of instructional interaction between the teachers and students or among colleagues and peers. All instructional interactions occurred, by necessity, within the same place at an identical time. However, this time, people are allowed to interact from different locations and at different times using audio, video, and internet technologies. Therefore, face-to-face learning may be a retronym that arose in response to instruction with technology-enabled forms particularly, asynchronous, and synchronous varieties of learning.

According to the Center for Excellence in Learning and Teaching at Iowa State University, Traditional (Face-to-Face) teaching (also known as in-person, F2F) emphasizes some elements like lectures, capstones, team projects, labs, studios, and so forth. In the conduct of traditional teaching synchronously in a physical learning environment, the teachers and students are in the same place simultaneously but observing appropriate measures as well. One of the significant advantages of the traditional classroom, specifically face-to-face interaction is that students derive motivation from the teacher and the students themselves.

As noted from CMO No. 4, Series of 2020, flexible learning is a pedagogical approach flexible of the learner's time, place, and audience but not just focused on using technology. The utilization of the delivery methods of distance education and amenities of education technology in flexible learning may rely on technology levels, availability of devices, internet connectivity, level of digital literacy, and approaches.

Similarly, the CHED Chairperson Prospero de Vera defines flexible learning as a term that generally emphasizes the design and delivery of programs, courses, and learning interventions that address the unique needs of learners in terms of pace, places, process, and products of learning. He adds that flexible learning is not online learning because it does not necessarily require internet connectivity.

Transactional Distance (TD) does not only refer to a physical space of possible misunderstanding between what the teacher had taught and the learner but also a psychological and communication space (Moore & Kearsley, 1996). According to the theory of TD, the elements of distance education are associated with two variables, distance which consists of structure and dialog, and autonomy (Verduin & Clark, 1994, cited by Horzum, 2011). TD involves a dialog element that pertains to two-way interaction between the teacher and the learner. Also, the structure element refers to the extent of accommodation or level of responsiveness of an education program to the individual needs of each student. Lastly, autonomy determines the learning activities and evaluation criteria from the active participation of the students. Likewise, dialog and structure are considered by Moore (1997) as significant variables in distance learning.

Similarly, Bornt (2011) describes that Moore's Theory of Transactional Distance features direct comportment on e-learning because it explains and quantifies matters of the learning relationship considering the physical or temporal between the teacher and students. There are different forms of distance learning considered in the Transactional Distance Theory of Moore as first formulated in 1997. It is a portion of a group that could be analyzed similarly. Transactional distance compared to a physical or temporal distance pertains to the psychological or communicative space that separates the transaction between the teacher and the learner which happens in a learning situation that is structured or planned (Moore, 1997). In Moore's Theory, dialogue, structure, and learner autonomy are the three cluster elements that control the extent of transactional distance. It is possible to increase dialogue between the teacher and students by communicating media manipulation which reduces transactional distance. Consequently, a highly structured program and the absence of teacher-student dialogue could result in a high transaction between the teacher and the student. However, a little predetermined structured program and much dialogue of teacher-student could have a low transactional distance. The third element is learner autonomy which refers to the goals, learning experiences, and evaluation decisions of the learning program which is determined by the student instead of the teacher. The more autonomy the student must exercise will produce greater transactional distance. Hence, the course might be designed as it may well be tightly structured with a minimum dialogue to increase the transactional distance so that target students will have a passion for autonomy. In the full-scale integration of the computer into society, the theory of Moore (1997) was considered. It introduces an extra component which is the mixture of the improved teleconferencing abilities of the computer and the internet-broadened bilateral dialogic relationship between the teacher and the student into a multilateral relationship which could further include other students.

Blended learning can be considered a good practice and its use as a delivery method can manifest two of Chickering and Gamson's (1987, p. 3-7) Seven Principles as follows: "encourage students to engage in active learning" and "encourage contact between students and faculty". This kind of learning can elicit another good practice principle to give quick feedback. It usually involves online interaction to facilitate feedback. But prompt feedback depends on how frequently the teachers and students utilize the relevant online platform.

Moreover, blended learning is defined by the Glossary of Education Reform (2013) as generally uses experiences in both online and in-person learning when teaching the students. In a course that uses blended learning, students might attend a traditional classroom setting with a teacher instructing them, while independently attending a class online outside the classroom. In this scenario, the in-person and online learning experiences would parallel and complement one another because traditional settings may be replaced or supplemented by online learning experiences, and students may learn identical topics as they do in class.

Blended learning is also called hybrid learning and mixed-mode learning. It may vary from school-to-school design and execution. Some teachers can use blended learning provided by the school or it can be the leading delivery of a learning model as designed in the academic program of the school. Online learning is the use of the minor-part of a classroom-based course like the use of video-recorded lectures, live video and text calls, and other digitally-enabled learning activities which may be a primary instructional interaction between the teacher and the students. In some scenarios, students may become independent learners on their online lessons, projects, and assignments. Teachers may conduct meetings for the review of the students' learning progress periodically, discuss students' work, ask questions, or assist them in the difficult concepts. In some cases, students will devote their whole day to a traditional school building, though they will spend more time working online and independently than receiving instruction from the teacher. Hence, there are numerous potential variations of blended learning.

According to Merriam Webster, distance learning is a way of learning with the use of the internet, e-mail, mail, and others to have classes because teachers and students do not meet in a traditional classroom or simply, distance learning is the separation of a student from teacher and peers. This could mean that students will learn remotely beyond face-to-face learning with teachers and other students.
Consequently, Simonson (2016) notes that distance learning which is also called distance education, e-learning, and online learning is an educational process in which the primary elements consist of the physical separation of teachers and students during instruction and the use of different technologies to facilitate their communication. Traditionally, distance learning was focused on students who were full-time workers, military personnel, and students who were not able to attend classes because they were living in remote regions. However, distance learning is a recognized educational process of the educational world.
Moreover, online learning refers to the use of educational tools which are available on the internet. This means that students could also use online learning while they are physically present inside the classroom with their teachers and peers because online learning can be used anywhere and anytime, and so teachers allow students to use them in class or for preparation and assignments at home. Online learning tools are often used by teachers to form a blended learning environment in the classroom. This keeps students involved in the class and engaged in the material and helps teachers save time for preparation before class. Also, teachers can spend more time grading papers, giving individual attention to students, and maybe getting some free time in their busy work schedule.
According to The Economic Times, a learning system based on formalized teaching with the support of electronic resources is known as E-learning. The use of computers and the internet builds the most important component of E-learning, though teaching can be based in or out of the classrooms. E-learning is also defined as a transfer of skills and knowledge using enabled networks, and the delivery of education to a great number of receivers at identical or different times is to be completed. Before, E-learning was unrecognized because this system was assumed to be deficient in the human element essential in learning. However, it is now embraced by the people because of the speedy progress in technology and the improvement in systems of learning. The foundation of this insurgency was the introduction of computers and different devices that have an important place in the classrooms for learning like smartphones, tablets, etc. Electronic educational materials like optical discs or pen drives are more useful than books. Information and facts can also be easily accessible through the internet, anytime, anywhere.
In addition, virtual learning refers to learning that takes place outside of the classroom or bringing what is outside the classroom into the classroom (Core Education). Hence, an online environment is a means of connection between the teacher and the students who are located physically in a school and learning that is somewhere else.

Outcome-Based Education (OBE)

Outcome-Based Education is defined as the process to know that learning happens. It starts with the important ability of the students which is represented, then making sure that the curriculum, instruction, and assessment are organized. The content of the activities is expressed that leads to specific outcomes and indirectly leads to increasing the skill, knowledge, or behavior of the students. Moreover, Tucker (2004) defines OBE as a process that encompasses the reformation of curriculum, assessment, and practices in education reporting where high order learning and mastery are reflected rather than the course credit accumulation. On the other hand, it was noted by Williams (cited by Tavner, 2005) that the basic views of OBE that focus on educational activity shifted from teaching to learning; thinking skills; content to process; and instruction to a demonstration of the students.

Technological Pedagogical Content Knowledge (TPACK)

According to Koehler and Mishra (2009), Technological Pedagogical Content Knowledge (TPACK) refers to the knowledge needed for teachers to integrate technology in their teaching through addressing the complex, multifaceted and situated knowledge of teachers. There are seven mechanisms of TPACK based on Shulman's idea of Pedagogical Content Knowledge namely, Content Knowledge (CK), Pedagogical Knowledge (PK), Technology Knowledge (TK), Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), and Technological Pedagogical Content Knowledge (TPACK). Content Knowledge (CK) is defined as the teachers' acquaintances on what to be learned or shared about a subject matter (Koehler & Mishra, 2009). According to Shulman (1986), the knowledge of concepts, theories, ideas, organizational frameworks, evidence, and proof comprised this knowledge. It also includes the practices and approaches necessary toward developing this knowledge. Pedagogical Knowledge (PK) is described as the deep knowledge of teachers which includes the teaching and learning processes and methods. PK focuses on the purposes, values, and aims of education. Understanding how students acquire knowledge, management skills, lesson planning, and assessment of students are the applications of PK. On the other hand, Technology Knowledge

(TK) is defined as the knowledge in the application of technology, its tools, and resources. Enough understanding of information technology to be applied at work and in everyday life effectively, the ability to recognize if information technology can contribute to the attainment of a goal, and to continually familiarize information technology changes are included in TK (Koehler & Mishra, 2009). Moreover, Pedagogical Content Knowledge (PCK) means the understanding of pedagogy when teaching a subject matter. PCK is the teaching transformation of a subject matter. As noted by Shulman (1986), when the teacher has subject matter interpretations and representations, and instructional materials adaptation to alternate origins and past knowledge of students, transformation happens. The situations that help encourage learning and link it to curriculum, evaluation, and teaching are the coverage of PCK. Another component of TPACK is Technological Content Knowledge (TCK) which is described as the knowledge of how technology affects a subject matter and vice versa. Mastery and having deep knowledge of how to apply specific technologies in the teaching of the subject matter is important, especially if these technologies are suited to learning the subject matter and how content commands or even changes the technology used (Koehler & Mishra, 2009). Another is Technological Pedagogical Knowledge (TPK) which pertains to the knowledge of using specific technologies in different ways wherein it can change teaching and learning. TPK includes being knowledgeable of pedagogical limits of the tools of technology associated with appropriate strategies and designs of pedagogy (Koehler & Mishra, 2009). Finally, Technological Pedagogical Content Knowledge (TPACK) is described as the understanding of the true meaning and having a deep knowledge of teaching using technology. Also, TPACK was described as effective teaching using technology which requires a knowledge of the representation of concepts; applying pedagogical techniques in teaching content with the use of technologies in a useful way; understanding how technology can solve some problems faced by the students and what makes learning the concepts becomes difficult or easy; understanding of the past knowledge of students and epistemology theories; and understanding of how to create on existing knowledge to strengthen epistemologies by using technology (Koehler & Mishra, 2009).

Approaches to Learning and Studying

According to Entwistle (2012), approaches to learning pertain to the students' different ways of transmitting tasks into learning. Three approaches to learning and studying were described, namely surface approach, deep approach, and strategic approach. The surface approach and deep approach pertain to learning while the strategic approach pertains to systematized and engaged studying. With time and context stability, students have individual differences, but they have different conditions of learning. They can be affected by how they were taught, how they learned, and how they were assessed based on what they encountered as an individual.

Mathematics Content and Pedagogical Knowledge for Teaching

Knowledge of the subject matter of teachers and how they teach it rest on teacher education literature and professional development in mathematics. As noted by Shulman (1986), teaching mathematics effectively is the integrated part of mathematics content knowledge and pedagogical content knowledge. The need to construct concepts of mathematics in the minds of students, particularly, knowledge of pedagogy and mathematical content knowledge is important. The integrant factors of pedagogical content knowledge are seen on their knowledge of content concerning their pedagogical knowledge and how content knowledge becomes a part of the pedagogical reasoning process (Cochran, DeRuiter & King, 1993). Pedagogical Content Knowledge (PCK) is defined by Shulman (1986) as the knowledge essential for a teacher to teach lessons effectively. Also, Ball (2000) defines it as the knowledge of teaching content-specific subject matter in mathematics instruction.

Meanwhile, the so-called missing paradigm in practice teaching and research was introduced by Shulman (1986) and thinks that PCK is the possible answer. Focusing on content and pedagogy are the approaches to teaching. He also believes that the mentioned approaches were absent in every characteristic of the knowledge base of teachers. Hence, he describes PCK as the distinct form of knowledge of content and pedagogy (Shulman, 1987). Shulman (1987) also distinguishes two main components of PCK. One component is the most essential form of topic representation, and the other is the knowledge on how easy or difficult topics are learned by the students. Besides, he includes other components in the knowledge base of teachers like knowledge of content, general pedagogical knowledge (PK), knowledge of curriculum, and learners' characteristics and knowledge, knowledge of contexts in education, and knowledge of educational ends, purposes, and values.

Since the introduction of PCK, different researches had resulted in both developments of theories and experimental research. Shulman's primary PCK framework was the basis of the expansion of some authors. One of the authors who studied PCK was Grossman (1990) in the language setting in which he added two components to the original PCK components of Shulman. These components were knowledge of curriculum and knowledge of teaching purposes. Another expansion was made by Magnusson, Krajcika, and Borko (1999) that became very significant in the science context. They added three components to the original PCK components which comprised of knowledge and beliefs to science teaching, knowledge of the curricula of science, and knowledge of scientific literacy assessment. On the other hand, Ball, Thames, and Phelps (2008) had focused on the concepts of mathematics which have become very influential on the content knowledge for teaching mathematics (CKTM). CKTM is comprised of PCK and CK and each is divided into three components. PCK includes (1) knowledge of content and students like the knowledge of students' misconceptions of Shulman; (2) knowledge of content and teaching like the knowledge of teaching representations; and (3) knowledge of the curriculum. Also, CK includes (1) common knowledge of mathematical content used in contexts of education; (2) specialized knowledge of mathematical content used in the contexts of teachings that are unique; and (3) knowledge on how to isolate topics of mathematics and determine their relationships.

Effective teaching requires a skill for understanding what the students are capable of doing and what they still need to learn. To be effective, teachers must understand that learners need to be inspired and are different individuals. Teachers must be skillful in choosing a variety of teaching modalities because these modalities execute a crucial role in the educational process. They can enhance the academic skills of the students. In a study conducted by Faize (2011) on the effect of availability and use of instructional materials on the academic performance of students in Punjab (Pakistan), it was concluded that less availability, misallocation, and deficiency in the use of instructional materials lead to the wastage of resources, less effectiveness of instructional material and lower academic performance. Additionally, these modalities can help in providing ideas and practices which frame classroom activities by any means that help teachers in achieving goals, and students in understanding the lesson properly. Hence, instructional materials like learning modules and video-recorded lectures are essential because they can significantly increase students' achievements. A strong foundation of understanding Data Management in Mathematics in the Modern World subject, development, validation of the learning modules and video-recorded lectures for flexible learning and identifying the strengths and weaknesses of the materials was deemed necessary.

Furthermore, this paper investigated the teachers' profile in terms of mathematics content and pedagogical knowledge for teaching, flexible learning readiness, and students' profile in terms of flexible learning readiness, learning and studying approaches in mathematics that served as basis for a quality assured module and instructional videos in Data Management of Mathematics in the Modern World subject that fits flexible learning. Consequently, this study also concentrated on the approaches to learning and studying just like the focus of Nordin, Wahab, and Dahlan (2013), Mattick, Dennis and Bligh (2004), Campbell, Smith, Boulton-Lewis, Brownlee, Burnett, Carrington, and Purdie (2001), and Trigwell, Prosser, and Waterhouse (1999). But the difference is the approaches to learning and studying mathematics used in the study. However, similar studies which focus on pedagogical content knowledge was the study of Naseer (2018), Odumuso, Olisama and Areelu (2018), Maru'fi, et al. (2018), Papanikolaou, Makri, and Roussos (2017), Jaipal-Jamani and Figg (2015), Harr, Eichler, and Renkl (2014), Tsafe (2013), Lim and Guerra (2013), Kleickmann, et al (2012), Turnuklu and Yesildere (2007). This study was different because it focused on mathematics content and pedagogical knowledge for teaching considering a questionnaire assessed by the Department Chairman of the Mathematics teachers.

METHODS

Quanlitative methods of research were employed in a developmental study conducted in Isabela State University, which included the participation of 12 teachers and 241 students. To measure mathematics content and pedagogical knowledge for teaching, the study adapted a questionnaire from SEI-DOST and MATHTED (2011b), while the teachers' flexible learning readiness questionnaire was adapted from the Learner Enrolment and Survey Form for S.Y. 2020-2021 of the Department of Education (Dep Ed Order 8, Series 2020) and from the Faculty Online Readiness Assessment of UCF's Center for Distributed Learning (2018). The students' approaches to learning and studying mathematics questionnaire was adapted from the Approaches and Study Skills Inventory for Students (ASSIST) incorporating the Revised Approaches to Studying Inventory (RASI) developed by Entwistle, McCune, and Tait (2013). Additionally, the students' flexible learning readiness questionnaire was adapted from the Learner Enrolment and Survey Form for S.Y. 2020-2021 of the Department of Education (Dep Ed Order 8, Series 2020) and from the Distance Learning Readiness Assessment of the Eastern Wyoming College. All adapted instruments were highly reliable, as determined by the Cronbach's alpha value during reliability testing. The collected data and information were analyzed using the Statistical Package for Social Sciences (SPSS), a computer application.

RESULTS AND DISCUSSIONS

Mathematics Content and Pedagogical Knowledge for Teaching of Teachers

Table 1: Mathematics Teachers' Content Knowledge

Mathematical Content Knowledge	Mean	SD*	QI**
Mathematical Concepts	3.71	0.46	Expert
Mathematical Processes	3.52	0.50	Expert
Communication	3.46	0.51	Accomplished
Connection	3.31	0.47	Accomplished
Mean	3.50	0.50	Expert

Legend: 3.50 – 4.00 = Expert; 2.50 – 3.49 = Accomplished; 1.50 – 2.49 = Emerging; 1.00 – 1.49 = Novice; * standard deviation; ** qualitative interpretation

Table 1 shows that the mathematics teachers who participated in the study have a high level of expertise in different mathematical content knowledge areas (mean = 3.50, SD = 0.50), indicating a strong overall understanding of mathematics. These teachers possess a deep understanding of mathematical concepts and are able to effectively blend theory and practice in mathematics education. Additionally, they are willing to support the ongoing development of mathematics teaching and learning. This is consistent with previous research which suggests that deep knowledge of mathematics content and pedagogy is essential for effective teaching (Odumosu, Olisama, & Areelu, 2018; Turnuklu & Yesildere, 2007). While the teachers demonstrated a high level of competence in mathematical concepts (mean = 3.71, SD = 0.46), they scored lower in their ability to construct connections (mean = 3.31, SD = 0.47). This may be attributed to the difficulty of integrating the understanding of mathematical connections into mathematical teaching. It is therefore important for mathematics teachers to develop skills in making connections in their instruction to facilitate holistic development. The teachers in the study showed a commitment to personal and professional growth by attending seminars, establishing affiliations, and being active in organizations.

Table 2: Mathematics Teachers' Pedagogical Knowledge

Pedagogical Knowledge	Mean	SD*	QI**
Knowledge on School Mathematics Curriculum	3.54	0.53	Expert
Knowledge of Students' Cognition of Mathematics	3.44	0.50	Accomplished
Knowledge of the Tasks of Mathematics Teaching	3.65	0.48	Expert
Knowledge of Mathematical Discourse	3.41	0.49	Accomplished
Mean	3.51	0.51	Expert

Legend: 3.50 – 4.00 = Expert; 2.50 – 3.49 = Accomplished; 1.50 – 2.49 = Emerging; 1.00 – 1.49 = Novice; * standard deviation; ** qualitative interpretation

Based on Table 2, the mathematics teachers exhibit a high level of pedagogical knowledge with a mean score of 3.51 and a standard deviation of 0.51. This indicates that they possess a strong understanding of effective teaching strategies and pedagogies in mathematics education. According to Roberto and Madrigal (2012), the competence of teachers in teaching standards is determined by their knowledge, skills, and attitudes gained through their participation in various in-service trainings and programs. In terms of specific areas of competence, the teachers scored highest in mathematical teaching tasks (mean = 3.65, SD = 0.48) such as problem selection, assessment, technology use, and materials development related to mathematics instruction. However, they scored lowest in their understanding of mathematical discourse (mean = 3.41, SD = 0.49), which implies that there is a need for improvement in their ability to communicate and engage in mathematical discussions with their students. Despite this, the mathematics teachers are still able to produce learning materials such as published books that support their teaching in mathematics.

Flexible Learning Readiness among Teachers

Table 3: Mathematics Teachers' Available Devices at Home for Flexible Learning

Devices	Frequency (Out of n = 12)	Percent (100.0)
Cable TV	4	33.3
Non-cable TV	0	0
Basic Cellphone	1	8.3
Smartphone	9	75.0
Tablet	5	41.7
Radio	0	0.0
Desktop Computer	3	25.0
Laptop	12	100.0
None	0	0.0
Others	0	0.0

Table 3 showed that 12 (100.0%) mathematics teachers commonly have laptops, nine (75%) have smartphones, five (41.7%) have tablets, four (33.3) have cable TVs, three (25%) have desktop computers, and one (8.3%) has basic cellphone. No one has available devices like non-cable TV, and radio that can be used for teaching. This is an indication that mathematics teachers have devices like laptops, smartphones, tablets, cable TVs, desktop computers, and basic cellphones available at home for flexible learning. Having these devices could help teachers to ensure that they are still connected and in-touched with the students. In addition, the capability to teach anytime, anywhere can be possible by using phones and mobiles in flexible learning (Cavus & Al-momani, (2011).

Table 4: Mathematics Teachers' Capability to Connect to the Internet

Do you have a way to connect to the internet?	Frequency N = 12	Percent (100.0)
Yes	12	100.0
No	0	0.0

As revealed in the table, most mathematics teachers have a way to connect to the internet. Teachers need to connect to the internet for the delivery of instruction since the conduct of face-to-face classes was suspended by CHED. Also, the internet is used to provide new ways of communication that make social interaction and learning simpler among students, as teaching and learning of students and teachers from one another form a distant place through various social networking platforms (Khosravi, 2016). This can be illustrated in Figure 15 where teachers and students from different places can communicate through Google Meet and messenger provided the internet connection is stable. Moreover, teaching and learning with the effective use of the internet not only bring changes in pedagogical improvement but also save time and space (Chirwa, 2018). The succeeding table displays the frequency and percent distribution of mathematics teachers' ways to connect to the internet.

Table 5: Mathematics Teachers' Ways to Connect to the Internet

Ways to Connect to the Internet	Frequency (Out of n = 12)	Percent (100.0)
Own mobile data	8	66.7
Own broadband internet (DSL, wireless fiber, satellite	11	91.7
Computer shop	0	0.0
Other places outside the home with internet connection (library, barangay/municipal hall, neighbor, relatives	0	0.0
None	0	0.0

Table 5 indicates that most mathematics teachers connect to the internet through their broadband internet like DSL, wireless fiber, and satellite (91.7%), followed by mobile data (66.7%). They need not go to the computer shop and other places outside the home to be connected. This means that teachers connect to the internet through their mobile data and broadband internet like DSL, wireless fiber, and satellite. Without internet connection their teaching could be affected because it is the only way to be connected with their students.

Table 6: Mathematics Teachers' Flexible Learning Modality/ies They Deliver

Flexible Learning Modality	Frequency (Out of n = 12)	Percent (100.0)
Modular learning	12	100.0
Video-recorded lectures	9	75.0
Book/e-book	4	33.3
Online learning	11	91.7
Others	0	0.0

Table 6 presents that most mathematics teachers commonly used modular learning (100%), followed by online learning (91.7%), video recorded lectures (75%), and e-book (33.3%) in the delivery of their instruction. This reveals that teachers have different ways of delivering their instruction to students like the use of modules, online learning, and video-recorded lectures, and e-book. Consequently, students have varied options on how they want to learn that are responsive to their needs for access to quality education (CMO No. 4, Series 2020).

Table 7: Mathematics Teachers' Flexible Learning Readiness on Technical Skills of Faculty

Technical Skills of Faculty	Mean	SD*	QI**
1. I have a computer or any gadgets available at home or in the office which I can use for instruction.	3.75	0.45	HR
2. I travel with a laptop or any gadgets for immediate purposes concerning my instruction.	3.66	0.49	HR
3. I can access and search over the internet frequently to address my needs.	3.25	0.75	MR
4. I am competent in using e-mail.	3.50	0.67	HR
5. I am competent in using word-processing software.	3.58	0.66	HR
6. I am able to record video of myself using a computer or any gadgets.	3.33	0.88	MR
7. I am able to download files from the internet and attach files in an e-mail.	3.58	0.51	HR
8. I am competent in using presentation software such as PowerPoint.	3.58	0.51	HR
9. I know how to use social networking technologies such as Facebook and Messenger.	3.66	0.49	HR
10. I am familiar with learning management systems such as Google Classroom, Edmodo and Moodle.	3.33	0.49	MR
Mean	3.52	0.59	HR

Legend: 3.50 – 4.00 = Highly Ready (HR); 2.50 – 3.49 = Moderately Ready (MR); 1.50 – 2.49 = Slightly Ready (SR); 1.00 – 1.49 = Not Ready (NR); * standard deviation; ** qualitative interpretation

As presented in Table 7, out of 10 statements on technical skills of the faculty, the mathematics teachers are highly ready on seven (7) statements having a mean range of 3.50-3.75. However, they are moderately ready on three (3) statements with a mean range of 3.25-3.33. Further, results indicate that the mathematic teachers are highly ready in terms of having a computer or any gadgets available at home or in the office which they can use for instruction, traveling with a laptop or any gadgets for immediate purposes concerning their instruction, accessing and searching over the internet frequently to address their needs, using email, word processing software, and presentation software, recording a video using a computer or any gadgets, downloading files from the internet and attaching files in an e-mail, using social networking technologies such as Facebook and Messenger, and with learning management systems such as Google Classroom, Edmodo, and Moodle. Notably, mathematics teachers are highly ready in having a computer or any gadgets available at home or in the office which they can use for instruction (mean = 3.75, SD = 0.45). This means that in times of uncertainty during this pandemic, the use of computers and gadgets to go with the flow of flexible learning is indispensable. As teachers of 21st century learners, it is a must thing. Teachers must ensure that they are still connected and can get in-touch with their students. Moreover, amidst the pandemic where face-to-face learning is suspended, online platforms can be essential tools to continuously provide quality in the educational aspect of students without just relying on the traditional ways. As noted in the study of Birbal, Ramdass and Harripaul (2018), teachers viewed technology tools as the most important aspect of learning in this time of the pandemic. Also, having computers or any gadgets that are available for use in teaching are teachers' ways to instruct and guide their students. Specifically, in using online platforms, students can be anywhere independently learning and interacting with teachers and other students (Singh and Thurman, 2019). In addition, they are moderately ready in accessing and searching over the internet frequently to address their needs (mean = 3.25, SD = 0.75). Nowadays, electronic gadgets and computers are necessary; thus, the presence of the internet to maximize and utilize them in the teaching and learning process is needed to a great extent. Also, being able to search is a great way to do a lot more in a smaller amount of time. Also, it allows teachers to better understand things, seek information, and have more significant ideas for local news and information. However, there are some challenges experienced by mathematics teachers in accessing and searching over the internet frequently. According to Ogbuiyi, Ogbuiyi and Oriogu (2014), the major challenges encountered in opening and online searching are low-speed access and fluctuation of internet services.

Table 8: Mathematics Teachers' Flexible Learning Readiness on Experiences with Flexible Learning

Experiences with Flexible Learning	Mean	SD*	QI**
1. I have undergone training in flexible learning modality.	2.50	0.90	MR
2. I have used technology to support my face-to-face teaching.	3.66	0.49	HR
3. I have used module in teaching my classes.	3.66	0.49	HR
4. I have used video-recorded lectures in teaching my classes.	3.41	0.90	MR
5. I have used books or other references in teaching my classes.	3.50	0.52	HR
6. I have experienced giving activities to my students which can be answered using various search engines like Google, YouTube, etc.	3.66	0.49	HR
7. I have used online quizzes/assignments in teaching my classes.	3.66	0.49	HR
8. I have used online and offline resources in teaching my classes.	3.83	0.51	HR
9. I have used virtual classroom tools like Google Classroom, Edmodo, and the like in teaching my classes.	3.66	0.49	HR
10. I have used Messenger in teaching my classes.	3.58	0.38	HR
Mean	3.51	0.57	HR

Legend: 3.50 – 4.00 = Highly Ready (HR); 2.50 – 3.49 = Moderately Ready (MR); 1.50 – 2.49 = Slightly Ready (SR); 1.00 – 1.49 = Not Ready (NR); * standard deviation; ** qualitative interpretation

As can be gleaned from Table 8, out of 10 statements on the experience of faculty on flexible learning, the teachers of mathematics are highly ready on eight (8) statements having a range of 3.50-3.83 and moderately ready on two (2) statements with a range from 2.50-3.41. Moreover, the teachers of mathematics are highly ready in terms of experience with flexible learning (mean = 3.51, SD = 0.57). This indicates that they are highly ready because they have undergone training in flexible learning modality, used technology to support their face-to-face teaching, module, video-recorded lectures, books or other references, online quizzes/assignments, online and offline resources, virtual classroom tools like Google Classroom, Edmodo, and the like, and messenger in teaching their classes, and have experienced giving activities to their students which can be answered using various search engines like Google, YouTube, etc..In detail, mathematics teachers are highly ready because they have used online and offline resources in teaching their classes (mean = 3.83, SD = 0.38). It is very helpful to deliver information and instruction to the students if the lesson is supported by different resources. Also, providing various resources in teaching could be a way of allowing the students not only to enhance their abilities but also to discover themselves more.

Table 9: Mathematics Teachers' Flexible Learning Readiness on Attitudes Toward Flexible Learning

Attitudes Toward Flexible Learning	Mean	SD*	QI**
1. I believe that flexible learning is as rigorous as classroom instruction.	3.66	0.49	HR
2. I believe that high-quality learning experiences can occur without interacting with students face-to-face.	2.83	0.71	MR
3. I recognize that community building is an important component of flexible learning.	3.33	0.77	MR
4. I feel comfortable communicating online/offline and feel that I'm able to convey information to my students.	3.08	0.51	MR
5. I am a critical thinker and can develop assignments that encourage critical thinking among students.	3.16	0.38	MR
Mean	3.21	0.57	MR

Legend: 3.50 – 4.00 = Highly Ready (HR); 2.50 – 3.49 = Moderately Ready (MR); 1.50 – 2.49 = Slightly Ready (SR); 1.00 – 1.49 = Not Ready (NR); * standard deviation; ** qualitative interpretation

Table 9 shows that out of five (5) statements, mathematics teachers are highly ready in one (1) of the statements and moderately ready in four (4) of the statements. As shown, the mathematics teachers are moderately ready in terms of their attitudes toward flexible learning (mean = 3.21, SD = 0.57). They are moderately ready in their belief that flexible learning is as rigorous as classroom instruction; that high-quality learning experiences can occur without interacting with students face-to-face; that community building is an important component of flexible learning; that they feel comfortable communicating online/offline and feel that are able to convey information to my students; and that they are critical thinkers and can develop assignments that encourage critical thinking among students. Particularly, they are highly ready in their belief that flexible learning is as rigorous as classroom instruction (mean = 3.66, SD = 0.49). Moreover, the mathematics teachers are moderately ready in their belief that high-quality learning experiences can occur without interacting with students face-to-face (mean = 2.83, SD = 0.71).

Table 10: Mathematics Teachers' Flexible Learning Readiness on Time Management and Time Commitment

Time Management and Time Commitment	Mean	SD*	QI**
1. I am able to log in to my virtual/online class at least once a day.	3.50	0.52	HR
2. I am able to post learning instructions, activities and announcements on my virtual/online class at least four to five times per week.	3.33	0.49	MR
3. I am able to manage my time well.	3.16	0.57	MR
4. I am flexible in dealing with students on issues like due dates, absences, and makeup assignments.	3.75	0.45	HR
5. I am fairly organized so I tend to plan ahead my teaching.	3.25	0.45	MR
6. I am responsive to my students since I can respond to their e-mails within 48 hours and to their assignments within a week.	3.41	0.66	MR
Mean	3.40	0.52	MR

Legend: 3.50 – 4.00 = Highly Ready (HR); 2.50 – 3.49 = Moderately Ready (MR); 1.50 – 2.49 = Slightly Ready (SR); 1.00 – 1.49 = Not Ready (NR); * standard deviation; ** qualitative interpretation

As seen in the table, out of six (6) time management and time commitment statements, the mathematics teachers are highly ready in two (2) of the statements and moderately ready in four (4) of the statements. The table shows that the mathematics teachers are moderately ready in their time management and time commitment. They are moderately ready in their ability to log in to their virtual/online class at least once a day, post learning instructions, activities and announcements on their virtual/online class at least four to five times per week, and manage their time well. Also, they are highly ready in their flexibility in dealing with students on issues like due dates, absences, and makeup assignments, planning ahead of their teaching because they are fairly organized, and responsive to their students since teachers can respond to their e-mails within 48 hours and their assignments within a week. Specifically, the teachers are highly ready in their flexibility in dealing with students on issues like due dates, absences, and make-up assignments (mean = 3.75, SD = 0.45). In addition, the mathematics teachers are moderately ready in their ability to manage their time well (mean = 3.16, SD = 0.57). This could be accounted to the fact that flexible learning is new to everyone, and teachers are still learning what to do and how to do the flexible learning to provide quality education to students. Likewise, there might be barriers that disrupt the management of their time like administrative position, noise, household chores, and slow internet connection.

Approaches to Learning and Studying Mathematics of Students

Table 11: Students' Approaches to Learning and Studying Mathematics

Approaches to Learning and Studying Mathematics	Frequency (n = 409)	Percent (100.0)
Deep Approach	183	44.74
Strategic Approach	157	38.38
Surface Approach	69	16.87

As shown in Table 11, most freshman students are deep approach learners (183 or 44.74%), some are strategic approach learners (157 or 38.38%), and still others are surface approach learners (69 or 16.87%). Results indicate that most of the students' study deeply to make serious attempts to turn other people's ideas into their personalized structure of knowledge. Specifically, they tend to understand and seek for themselves the meaning of what they have learned, relate ideas to previous topics or knowledge, and use evidence to come up with decisions. Their interest in mathematics makes them excited about studying it, and they can monitor the effectiveness of the requirements they do. As noted in the study of Campbell, et al. (2001), students with a deep approach to learning establish a more sophisticated understanding of the learning opportunities offered to them.

Table 12: Students' Approaches to Learning and Studying Mathematics on Deep Approach

Deep Approach to Learning Statements		Mean	SD*	QI**
Seeking Meaning	4. I usually set out to understand by myself the meaning of what I have learned.	3.15	0.54	A
	17.When I read an article or book, I try to find out by myself what exactly the author means.	3.06	0.63	A
	30.When I am reading, I stop from time to time to reflect on what I am trying to learn from it.	3.10	0.60	A
	43.Before tackling a problem or assignment, I first try to work out what lies behind it.	2.87	1.13	A
Relating Ideas	11.I try to relate ideas I come across to other topics or subjects whenever possible.	3.11	0.51	A
	21.When I'm working on a new topic, I try to see in my mind how all the ideas fit together.	3.22	0.52	A
	33.Ideas in mathematics books or articles often lead me to having long chains of thoughts of my own.	3.04	0.56	A
	46.I like to play around with ideas of my own even if they don't get me very far.	2.88	0.60	A
Use of Evidence	9.I look at the evidence carefully and try to draw conclusion about what I'm studying.	3.12	0.57	A
	23.I often find myself questioning things I heard in lectures or read in books.	3.14	0.59	A
	36.When I read, I examine the details carefully to see how they fit in with what's being said.	3.22	0.53	A
	49.It's important for me to follow the argument, or see the reason behind things.	3.21	0.54	A
Interest in Idea	13.I regularly find myself thinking about the ideas from the lectures when I'm doing other things.	3.00	0.59	A

Deep Approach to Learning Statements		Mean	SD*	QI**
	26.I find that studying mathematics can be quite exciting at times.	3.20	0.59	A
	39.I find some of the ideas I come across on the subject really gripping.	3.03	0.54	A
	52.I sometimes get hooked on academic topics and like to keep on studying them.	3.11	0.60	A
Monitoring Effectiveness	7.I go over the work I've carefully done to check the reasoning if it makes sense.	3.15	0.55	A
	20.I think about my gain on this subject to keep my studying well-focused.	3.25	0.54	A
	34.Before starting to work on my assignment or any exam question, I think first about how best to tackle it.	3.18	0.51	A
	47.When I finish a piece of work, I check it out to see if it really meets the requirements.	3.31	0.54	A

Legend: 3.50 – 4.00 = Strongly Agree (SA); 2.50 – 3.49 = Agree (A); 1.50 – 2.49 = Disagree (D); 1.00 – 1.49 = Strongly Disagree (SD); * standard deviation; ** qualitative interpretation

As can be seen in the table, the freshman students agree that they check it out to see if their piece of work meets the requirements when they finish (mean = 3.31, SD = 0.54). This signifies that those students tend to monitor their finished requirements if the guidelines are met to monitor its effectiveness.

Students' Flexible Learning Readiness

Table 13: Freshman Students' Devices Available at Home for Flexible Learning

Devices	Frequency (out of n = 409)	Percent (100.0)
Cable TV	52	12.7
Non-cable TV	75	18.3
Basic Cell phone	107	26.2
Smart phone	340	83.1
Tablet	31	7.6
Radio	67	16.4
Desktop Computer	16	3.9
Laptop	96	23.5
None	0	0.0
Others	0	0.0

As presented in Table 13, most freshman students commonly have smartphones (83.1%), followed by basic cell phone (26.2%), laptops (23.5%), non-cable TV (18.3%), radio (16.4%), cable TV (12.7%), tablet (7.6%), and desktop computer (3.9%). The results indicate that freshman students have gadgets available at home which they can use for flexible learning. Most of them have smartphones, basic cell phones, and laptops. Further, flexible learning through phones or mobile offers the student to learn anytime, anywhere (Cavus & Al-momani, (2011).

Table 14: Students' Capacity to Connect to the Internet

	Frequency (n = 409)	Percent (100.0)
Yes	403	98.5
No	6	1.5

Table 14 shows that 403 (98.5%) of freshman students have a way to connect to the internet and only 6 (1.5%) do not have a way to connect to the internet. Some freshman students have no means to connect to the internet even though they have available devices that they can use to access learning at home because their places are located in remote areas where internet connection is not available; they need to go to higher places to access the internet.

Table 15: Students' Ways to Connect to the Internet

Ways to Connect to the Internet	Frequency (n = out of 409)	Percent (100.0)
Own mobile data	258	63.1
Own broadband internet (DSL, wireless fiber, satellite	171	41.8
Computer shop	12	2.9
Other places outside the home with internet connection (library, barangay/municipal hall, neighbor, relatives	73	17.8
None	0	0.0

Table 15 shows that most of the freshman students commonly connect to the internet through their mobile data (63.5%), followed by their broadband internet like DSL, wireless fiber, or satellite (41.5%), other places outside the home with internet connection like a library, barangay/municipal hall, neighbors, or relatives (17.5%), and computer shop (3.2%). The results manifest that freshman students have their ways to connect to the internet through mobile data, and broadband internets like DSL, wireless fiber, and satellite.

Table 16: Students' Preferred Flexible Learning Modalities

Flexible Learning Modalities	Frequency (n = out of 409)	Percent (100.0)
Modules	317	77.5
Video-recorded lectures	275	67.2
Book/ebook	84	20.5
Online learning	101	24.7
Others	0	0.0

According to Table 16, most of the students commonly prefer modules (77.5%), followed by video-recorded lectures (67.2%), online learning (24.7%), and e-book (20.5%). The data mean that freshman students have varied modalities in flexible learning and most of them prefer modules and video-recorded lectures.

Table 17: Students' Readiness on Flexible Learning

Statements	Mean	SD*	QI**
I prefer to take control of my learning.	3.08	0.53	MR
Most people consider me a self-motivated person.	2.97	0.56	MR
I do not have a problem completing tasks without feedback or input.	2.48	0.65	SR
I am confident about my skills as a learner.	2.78	0.64	MR
I enjoy solving problems.	2.82	0.65	MR
I enjoy learning about new things.	3.34	0.55	MR
I am the kind of student who can figure out what needs to be done from the directions that are given regardless of how clear they are.	2.94	0.57	MR
I prefer working alone than in a group setting.	2.66	0.79	MR
I can easily set objectives for my learning tasks.	2.79	0.60	MR
I enjoy reflecting on the meaning of my learning experiences.	2.98	0.51	MR
I can effectively learn without face-to-face contact with the professor even though it may not be my preferred mode of learning.	2.26	0.80	SR
I believe that the experiences adults bring into the classroom are valuable for learning.	3.14	0.48	MR
I manage my time well.	2.70	0.73	MR
I believe that a professor is a facilitator of learning.	3.23	0.49	MR

Statements	Mean	SD*	QI**
I am comfortable with computer technology.	2.56	0.71	MR
I am aware of my preferred style of learning but can easily adapt to other ways.	2.87	0.58	MR
I know what it takes to get tasks completed.	3.01	0.47	MR
I am not easily discouraged when technology is used in learning.	2.75	0.63	MR
I have an above-average facility in navigating the internet.	2.56	0.61	MR
I enjoy challenging requirements in most learning situations.	2.67	0.64	MR
Mean	2.82	0.66	MR

Legend: 3.50 – 4.00 = Highly Ready (HR); 2.50 – 3.49 = Moderately Ready (MR); 1.50 – 2.49 = Slightly Ready (SR); 1.00 – 1.49 = Not Ready (NR); * standard deviation; ** qualitative interpretation

Table 17 indicates that out of 20 statements on freshman students' readiness for flexible learning, 18 statements are rated moderately ready, and two (2) are rated slightly ready by the students. Overall, the freshman students are moderately ready for flexible learning (mean = 2.82, SD = 0.66). Similarly, in the context of blended learning, students are ready (Adams et al, 2018) and very ready (Yulia, 2016).
Based on the results of the data analysis, the following are the general results.

The Mathematics Content and Pedagogical Knowledge for Teaching
Based on the evaluation of the Department Chairman, the mathematics teachers had an expert level of understanding of mathematical concepts, and facility to perform mathematical processes. Also, they had an accomplished level of capability in demonstrating language of mathematics especially in communicating its specialized vocabulary, symbols, and graphs and different mathematics representations, and capability in displaying connection of concepts to real-world situations. As a whole, the mathematics teachers had expert content knowledge as assessed by their department chairman or supervisor.
Further, the mathematics teachers had an expert cognition of the school mathematics curriculum contents, and varied tasks in mathematics teaching like problem selection, assessment, technology use, and materials development. Moreover, they had an accomplished cognition of appropriate mathematical tasks and methodologies of teaching, and mathematics discourse among students. In general, the mathematics teachers had an expert level of pedagogical knowledge as assessed by their department chairman or supervisor.

Teachers' Flexible Learning Readiness
The mathematics teachers had available devices at home for flexible learning and most of them commonly had laptops and smartphones and were connected to the internet through their broadband internet and mobile data, used modules, online learning, video-recorded lectures, and e-book in the delivery of instruction. Also, most of them were commonly challenged and encountered difficulties by unstable mobile/internet connection and being distracted by social media and noise from the community or neighbor.
Further, they were highly ready in terms of available technologies they can use for flexible learning, and competency in their experiences in using these technologies, software, learning management systems, social networking sites, and internets but they were moderately ready in their beliefs on flexible learning and their ability to manage their time. As a whole, the mathematics teachers were moderately ready for flexible learning.

Approaches to Learning and Studying Mathematics of Students
Most freshman students were deep approach learners. The students studied deeply to make serious attempts to turn other people's ideas into their personalized structure of knowledge. Specifically, they tend to understand and seek for themselves the meaning of what they have learned, relate ideas to previous topics or knowledge, and use evidence to come up with decisions. They also showed interest and were excited about studying mathematics and were able to monitor the effectiveness of the requirements they had done.

Students' Flexible Learning Readiness
Freshman students had available devices at home for flexible learning and most of them commonly had

smartphones and basic cellphones. Some of them had ways to connect to the internet through mobile data, broadband internet, other places outside the home with internet connection like in the barangay, and computer shop. Also, they commonly preferred modules, video-recorded lectures, online learning, and e-book in flexible learning. Further, most of them were commonly challenged and encountered difficulties by unstable mobile/internet connection and being distracted by social media and noise from the community or neighbor.
As a whole, the freshman students were moderately ready for flexible learning. They were moderately ready in learning new things enjoyably but slightly ready in learning effectively without face-to-face contact with the professor even though it may not be their preferred style of learning.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Although they are adept at teaching a variety of content areas, mathematics teachers sometimes struggle to make connections between their subject and other academic fields. Additionally, even if math teachers are masters in pedagogical knowledge for teaching, they lack the skills to recognize when pupils' comprehension of mathematical concepts and theories is flawed. Even though math teachers are only minimally prepared for flexible learning, they think that the lack of in-person connection will lead to poorer-quality learning experiences for their pupils. Although they are lacking in their attempts to look for the significance of an issue or assignment before they can respond or analyze it, first-year students are deep approach learners. Although it may not be their preferred method of learning, students are only marginally prepared for flexible learning and can study efficiently without face-to-face interaction with the professor.

Recommendations

Teachers of the topic "Mathematics in the Modern World" should focus more on gaining an understanding of how to connect the subject to other fields of study and spotting students who don't understand basic mathematical ideas and theories. To prevent disruptions from noise from the neighborhood or community, teachers should think about time management, especially when using social media, and should stay in a convenient location while instructing the students and creating instructional materials. For students to use higher-order cognitive skills to master academic content, work collaboratively, and think and interact critically and actively with the content being learned, teachers should include testing the materials given for flexible learning against general knowledge, everyday experience, and knowledge from other fields or courses. Last but not least, students should prevent distractions from outside noise by studying in a quiet area, and they should always use social media sparingly. It is also recommended that the findings of this study may be used for a quality assured module and instructional videos in Data Management of Mathematics in the Modern World subject that fits flexible learning.

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