



Investigating the Effects of Videoconferencing on Students' Interest in Learning Mathematics

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Abstract. The study investigated the effects of videoconferencing on students' interest in learning mathematics at Bukidnon State University Kitaotao Campus during the S.Y. 2021–2022. The respondents of the study were nine (9) selected Business Administration third-year students enrolled in Business Statistics subject. Specifically, the study aimed to identify students' preparations on videoconferencing, discussed students' experiences with videoconferencing, described how students perceived their learning for videoconferencing, and explained how students' practices, experiences, and perceptions affect their interest in learning. The study also made use of a case study qualitative research design using an exploratory approach. The data gathered was based on an interview results further coded, analyzed, and compared. Results of the study revealed that students' preparations before videoconferencing include conducting prior research, completing housework, and making sure to have all the necessary resources. Students' preparations during videoconferencing include taking notes, participating in the discussion, conducting research, asking questions, and paying close attention while videoconferencing. Students' preparations after videoconferencing include reviewing notes, relaxing, self-evaluate, doing assignments right away, and asking post-questions. Students' experiences varied; they each had unique experiences, but they all agreed that taking an online class saves time, but the poor internet connection was a major drawback. These good experiences included students' experienced approachable instructors, were given recognition, felt the true essence of collaboration, can do multi- tasks, felt comfortable learning at home, being involved, can answer their modular activities, and can contribute to the class. On the other hand, students' difficulties encountered were that they were unprepared, got bored, felt sleepy, distracted, mentally blocked, don't comprehend, remained silent, left the meeting, had an internet connection that went out unexpectedly, and lacked of funds. Despite the fact that students believe math is difficult to learn without a teacher, they continue to learn during online classes. The data analysis revealed four rationalized codes on the perceptions of students' learning in using videoconferencing: learning varies; learning is evident; learning is individualized; and learning is based on sufficient resources. Because of the abrupt transition in the educational process, the students' interests shifted dramatically and are positively and negatively affected. They were on the verge of losing interest because they believed that simply submitting the required requirements was sufficient to pass the subject.

Keywords: Students' preparations on videoconferencing · students' experiences on videoconferencing · students' perceptions in learning · students interest on

videoconferencing · students interest in learning Math · effects of
videoconferencing · advantages and disadvantages of videoconferencing

1 Introduction

The Coronavirus outbreak has inflicted severe damage worldwide, affecting every nation's economic, political, and social facets. It was then declared by the World Health Organization (WHO) as a Public Health Emergency of International Concern (PHEIC) on January 30, 2020 (Department of Health, 2020). Of the many facets, one of the most gravely affected is the educational sector, wherein schools were forced to close to safeguard the well-being of students, parents, teachers, and other school personnel. In the data presented by the United Nations (2020), 94% of the learners worldwide, which represents 1.58 billion children and youth from primary to higher education, were affected by the pandemic.

The Philippine government created the Inter-Agency Task Force (IATF) to respond to affairs concerning the nefarious effects of possible contagion of the disease in the country. The educational sector has responded to the educational disruption by ensuring the safety of learners by closing schools and universities (United Nations, 2020) and proposing various ideas on implementing alternative means of pursuing education amidst the threats of the pandemic. In response to the growing health crisis, the Commission on Higher Education (CHED) proposed new guidelines for the re-opening of classes. Prospero de Vera, CHED's chairperson, argued that the more practical solution amidst the Coronavirus threat is to move toward flexible learning, which uses digital and non-digital technology (Cervantes, 2020). This is also in accordance with the United Nations' (UN) call for governments to respond quickly and adapt to the new normal in education.

Bukidnon State University responds to the protocols and guidelines mandated by CHED, specifically on the continuity of education amidst the pandemic. The Office of the Vice President for Academic Affairs, together with the University President, Dr. Oscar B. Cabañelez, and the Board of Regents, has issued an Academic Contingency Plan III in light of COVID-19, which was approved on June 10, 2020. Academic policies and procedures were stated pre, during, and post flexible learning implementation.

In line with this, the main campus cascaded the policies and guidelines to its 16 satellite campuses. These guidelines provided the framework for operational procedures for the re-opening of classes following the flexible learning modality. In one of BukSU's satellite campuses, specifically in Kitaotao, Bukidnon, the faculty and staff agreed that the modality to be adopted would be modular, considering that 73% of the students do not have internet connectivity at home. However, students find it difficult to answer their module all alone without the teacher's assistance; therefore, the rise of information technologies through tele- collaborative/ online learning has become an essential complement to the modular learning approach. Online learning through videoconferencing is one of the modalities that makes it possible to have educational unification, connecting individuals who may be physically, socially, and/or culturally distant from each other.

On the other hand, one of the most significant problems which need the highest attention is students' disinterest in their Mathematics classes. Teachers directly point out

that frequent late in the submission of their unanswered modules, no modules returned, complains on the level of difficulty of their module topics, absent in the online classes, and no internet connectivity are students' common expressions of being disinterested to learn (Trilling & Fadel, 2009). If not addressed, the negative consequences of this learning interest deficit would affect through school and across industries, including society, for generations. In addition, we fail and jeopardize our students' future if we fail to make enhancements and advancements in the school's learning platforms flexible to the students in this new normal.

Videoconferencing is found as one of the technological systems that can be used to motivate more students to learn amidst this crisis. It is a synchronous model for interactive voice, video and data transfer between two or more groups/people (Wiesemas & Wang, 2010 as cited by Candarli & Yuksel, 2012). It is not a new technology as it has been used since 1968. However, it has not been used extensively as an educational tool until the pandemic COVID 19 came. Very few studies have investigated its effects on students' interest and learning as an educational tool in the Philippine educational context. The effects of videoconferencing as an educational tool depend on many factors.

Therefore, this study attempts to investigate the students' interest and performance using videoconferencing technology in higher education whether it is an effective learning tool for university students' mathematics performances in this new normal education.

1.1 Statement of the Problem

This study attempted to investigate students' interest in learning mathematics using videoconferencing technology in the Business Statistics (CBMEC 3) subject of Bukidnon State University Kitaotao Campus (BukSU KC) in new normal education.

Specifically, this study sought to answer the following questions:

1. What are students' preparations for videoconferencing?
2. What are students' experiences with videoconferencing?
3. How do students perceive their learning during videoconferencing?
4. How do students' practices, experiences, and perceptions of videoconferencing affect their interest in learning?

1.2 Objectives of the Study

This research aimed to investigate students' interest in learning mathematics using videoconferencing technology in the Business Statistics (CBMEC 3) subject of Bukidnon State University Kitaotao Campus (BukSU KC) in new normal education.

This study specifically sought to:

1. Identify students' preparations for videoconferencing;
2. Discuss students' experiences with videoconferencing;
3. Describe how students perceived their videoconferencing learning; and
4. Explain how students' practices, experiences, and perceptions affect their interest in learning.

1.3 Significance of the Study

This research study aimed to investigate the effects of videoconferencing technology as an educational tool in delivering instruction in this new normal of education. Also, the study explored the practices, experiences, and perceptions on the use of such educational tool on the students' interest in learning.

Due to these sudden changes, HEIs face a plethora of problems related to the implementation of flexible learning on the part of students, instructors, and even in the institutional standards, such as the lack of gadgets available for learning, internet accessibility, especially to schools located in remote areas; learning environment, motivation behaviors, training sufficiency, and cost implications. These are just a few of the reasons why the conduct of this study is of high significance.

For students, this study would help them enhance their critical thinking, collaborative, and technological skills in dealing with the challenges of the new normal education. In addition, this study might help students regain their interest in learning math even from a distance.

This study will assist teachers' in future instructional decision-making by providing students with alternative ways of expressing their understanding of mathematics to cater to diversity in the classroom, making Mathematics more engaging for students in this new normal education. Likewise, this study would help teachers advance their skills in dealing with technology, improve their ways and means of conducting online classes, and develop their sense of being resourceful.

This study would also help curriculum developers by providing necessary data as the basis for curriculum reviews and modifications and by identifying the common challenges in implementing videoconferencing technology in any context, not just in the field of mathematics.

For researchers who value learning, this study would equip them with knowledge about the world and the skills to help them face the challenges of 21st century learners. This study would serve as related literature regarding videoconferencing as a new trend in learning this new normal education. Furthermore, this study might provide recommendations for future studies to improve the efficacy of conducting online classes.

This study would also help school administrators plan better how to improve learning in this pandemic, besides helping them in any decision-making towards providing quality education.

1.4 Scope and Delimitation

The respondents were limited only to the Bachelor of Science in Business Administration (BSBA) third-year students of Bukidnon State University Kitaotao Campus (BukSU KC), who were enrolled during the first semester of the academic year 2021–2022 of the subject CBMEC 3, with the course title Business Statistics.

This study was limited to module 2 of the Business Statistics Module (Remo, 2020). Module 2 is entitled "Data Management," and the course outcome is that students are expected to manage the data through collecting, organizing, and expressing it verbally, graphically, symbolically, and numerically. The study concentrated on Lesson 2 of Module 2, which is sampling, and includes topics on statistical terms in sampling, probability

sampling, and non-probability sampling. Lesson 2 learning outcomes include identifying the appropriate sampling technique in a particular situation and applying the different sampling techniques in a real-world situation.

1.5 Conceptual Framework

This study was anchored on theories that were particularly relevant to learning processes that have impact on the design and use of computer-based instructional technologies. First is B.F. Skinner's (1974) stimulus-response reinforcement theory, as cited in Chen et al. (2005). The assumption of learning in this paradigm was that a learner would gradually develop responses to specific stimuli if a specific reinforcement followed such responses. Essentially, behaviorism held that a learner was primarily a product of conditioning and that the learner was controlled by factors other than himself.

The primary task of a teacher in this learning model was to provide stimuli and reinforcement to students following desired response. For example, if the student correctly answers the situational question during the video conference, he or she will be given the first "opportunity to speak in front of the camera." The "stimulus" was the situational question, the "response" was the student's answer, and the opportunity to speak in front of the camera was the "reinforcement." Students had the opportunity to recite in front of the camera during video conferencing. Skinner argued that because no scientific method could be used to prove the inner processes, researchers should focus on cause-and-effect relationships within empirical observation (Robleyer et al., 1997).

Second, as McLeod points out, Lev Vygotsky's Social Development Theory (1978) emphasized the fundamental role of social interaction in the development of cognition, as he firmly believed that community plays a central role in the process of "making meaning" (2007). The tutor may serve as a role model for the child and/or give verbal instructions. Vygotsky refers to this as cooperative or collaborative dialogue. The tutor's (often the parent or teacher's) actions or instructions were attempted to be understood by the child, who then internalized the information and used it to guide or regulate their own performance.

Vygotsky put a greater emphasis on culture influencing or shaping a child's cognitive development when it came to the use of technology in mathematics education. According to his theory, the learner participating in classroom video conferencing may have valuable inputs in promoting a culture of peace based on what he or she learned from his or her cultural background through the sharing process. The learner's responses to the extent of their understanding of peace may differ depending on their socio-cultural environment at home. Thus, in order to carry out an activity, Vygotsky's theory referred to the learner, the technical process, the product, and the community within which the learner.

2 Research Procedure

The procedures that were employed in this study were guided by the methodology of the case study approach by Rashid et al. (2019), which consists of four phases, namely: "1) foundation phase, 2) prefield phase, 3) field phase, and 4) reporting phase". Rashid stressed that these phases are more focused on theory than practice, and most do not

provide the basic knowledge of beginners' case studies (Hancock & Algozzine, 2016). Moreover, he also identified eight steps or procedures inherent in the said phases.

Foundation Phase

According to Rashid et al. (2019), the first and most important phase in the case study. This phase is based on a few factors that researchers should thoroughly investigate. The section that follows discusses the literature, which is briefly explained based on the limitations of this study. This brief literature review assisted the researcher in setting the tone for the following considerations:

a. Philosophical considerations

Understanding research philosophy is crucial, as it builds the basis for how one approaches research (Wilson, 2014). This study is anchored on one of the different philosophical and practical considerations in qualitative research called interpretivism.

Interpretivism, as described by Greener (2008), allows the researcher to have multiple views on a research problem because it allows the researcher to see the world through the eyes of the participants. From an ontological viewpoint, interpretivists are interested in the relativist or subjective realities that exist in any research issue, as cited by McKenna, Richardson, & Manroop (2011). The epistemological stance of interpretivism is that of subjective epistemology.

As an interpretivist researcher, one must be involved in interpreting elements of the study, thus integrating students' interests into this study. As interpretivism emphasizes social context and students' complexity concerning how they understand the phenomena, one should not see the world in an objective light. Instead, students construct the world, each perceiving their reality. An interpretive view suggests that human beings construct meanings as they engage with the world they interpret (Orlikowski & Baroudi, 1991). These realities need to be understood to understand the students. One should aim to achieve a deep understanding of the social phenomenon under study and recognize the importance of student participants' subjectivity as part of this process. Research participants use their own words while relating their experiences and beliefs.

b. Inquiry techniques considerations

The researchers' decision to conduct case study research with qualitative methods is based on various reasons.

Firstly, the nature of the problem set under study requires an in-depth investigation of the effects of having to videoconference on students' interest and learning in mathematics. Investigation helps dig deep into student participants' thoughts to understand how videoconferencing affects their interest and learning in math. Qualitative techniques are suitable in this context as this approach is used for investigating individuals. Some of the research on videoconferencing has employed various qualitative methods that support valid research methods.

Secondly, the effect is contextual and determined by student participants involved in the videoconferencing process. The study emphasizes that students' experiences, practices, and perceptions of having videoconferencing affect their interest and learning in mathematics. A qualitative approach is appropriate to understand the effects of such a process. The qualitative perspective allows informants to "use their own words to draw

on their concepts and experiences” (Orlikowski & Baroudi, 1991). This allows a broad understanding of the concept and identifies areas and discussions that have yet to be reported.

Thirdly, the case studies aimed to discover the processes involved in videoconferencing. Therefore, it is closer to “theory creation” research than “theory testing.” Participants are approached in a natural setting to discover what is to be known about the process. The goal is to discover patterns containing evidence of collaboration among actors, which emerged after observation, careful documentation, and thoughtful interpretation of the empirical data.

c. Research logic considerations

Researchers use abduction as research logic for their multiple case studies. The selection of an abductive stance is rationalized for three main reasons. Firstly, the primary research objective is to identify students’ practices during videoconferencing. Secondly, discuss students’ experiences during videoconferencing. Thirdly, describe how students perceive their learning during videoconferencing. Lastly, explain how students’ practices, experiences, and perceptions affect their interest in learning.

Prefield Phase

This is the second phase of conducting a case study. This phase discusses the operational details that should be carefully designed. This section discusses operational steps and guides to assist the researcher.

Case Study Protocols

This section includes a step-by-step approach on conducting the research. It outlines the research questions, the research scope, and the study’s focus. Issues relating to empirical material collecting and step-by-step processes such as preparing an empirical material collection and an interview guide are explored. This includes the following:

(i) Research question

This research investigates students’ interests and learning using videoconferencing technology in learning Business Mathematics (CBMEC 3) at Bukidnon State University Kitaotao Campus (BukSU KC) in new normal education. Specifically, this study aims to: identify students’ practices during videoconferencing. Discuss students’ experiences during videoconferencing. Describe how students perceive their learning during videoconferencing and explain how the practices, experiences, and perceptions of students affect their interest in learning.

(ii) Research method

This study utilized a qualitative research methodology using a case study design. The explanatory approach in the case study design was specifically used to investigate

the effects of videoconferencing on students' interest and learning in mathematics as new trends in education today.

(iii) Permission seeking

Permission seeking promptly is one of the essential steps in any research. Current employment and personal contacts play a crucial role in selecting relevant studies. In this case study, permission was taken at two levels. The first level is called "gatekeeper permission." The information about students was requested from the campus mathematics teacher. The mathematics teacher was approached first, and the campus in charge was requested further information about the participants. The second level of the permission was related to the participants. It will be ensured that participants will be given enough information to make an informed decision regarding their participation.

(iv) Ethical considerations

The researcher followed complete ethical standards in the study's conduct. Adhering to the study protocol assessments and standardized criteria, particularly in managing the population and data, such as but not limited to voluntary participation, in which respondents have free will to participate without any form of consequence or penalty.

(v) Interpretation process

Particular software to analyze qualitative data or Nvivo was used to analyze the data. The software serves to provide insights into qualitative data sets without suggesting interpretations. This qualitative data and text analysis software makes it simple to sort, structure, and handle the interpretations and evaluations of findings from enormous quantities of text or other data. In the coding process, initial, expanded, and rationalized coding were used to analyze the data.

(vi) Criteria for assessment

Credibility, transferability, dependability, and confirmability are the four main criteria for assessing this qualitative research study. The intention of qualitative research is the interpretation of the events and not to generalize the findings (Merriam, 1988).

Field Phase

a. Contact

In this study, non-probability sampling was utilized, in which researchers relied on their own opinion when selecting participants of the population to participate in this study via interview. In determining such cases for an investigation, purposive sampling techniques were used in selecting participants.

Contact can be clarified with the example of various authors' case study in which empirical material collection was done through in-depth interviews. In this study, the researcher will arrange three interviews with the students that belongs to these categories: (1) students who use google meet with high grades and varying levels of learning interest, (2) students who use google meet with average grades and varying levels of learning interest, and (3) participants who use google meet with low grades and varying levels of learning interest. Observing virtual meetings and reviewing documents such as recorded

meeting notes and modular activities are also considered to strengthen the study. The objective of conducting interviews with participants is to investigate the effects of videoconferencing on students' interest and learning in Mathematics. The interview that will be conducted revolved around students' experiences, practices, perceptions, learning, and interest in Mathematics. Questions are asked in a predefined structure. Moreover, the researcher prepares a list of sub-questions that are needed to be discussed.

The identification of the respondents was based on the result of the assessment test and assessment of interest. This is to ensure that the case possesses the characteristics mentioned earlier.

Moreover, the study participants were selected from the school known to have adopted the blended learning modality, which includes modular and online approaches in teaching their students, have students enrolled in Mathematics, and whose teachers are interested in participating in the investigation.

b. Interact

This phase entails creating a strict data collection protocol and going out into the field to investigate compound data sources and apply different data types.

Many data collection methods, such as in-depth interviews with students, will be used to address the study's dependability and construct validity. The Mathematics teacher is also asked for modular outputs for triangulation reasons. Due to the epidemic, classroom observation was not adopted because there was no face-to-face interaction between the teacher and the pupils (COVID-19).

Reporting Phase

Case study reporting is as important as empirical material collection and interpretation. A case study's quality depends not only on the empirical material collection and analysis but also on its reporting (Denzin & Lincoln, 1998). A sound report structure and "story-like" writing are crucial to case study reporting. The following points or case descriptions should be deliberated while reporting a case study.

a. Participant descriptions

The participants of this study are 9 students from Bukidnon State University Kitaotao Campus selected using a purposive sampling technique. The participants fall under the following categories:

1. Students who use google meet with high grades and varying levels of learning interest
2. Students who use google meet with average grades and varying levels of learning interest
3. Participants who use google meet with low grades and varying levels of learning interest

b. Relationship descriptions

Relationships among participants should also be observed and reported accordingly. In the study, there was an established relationship between actors. Both main actors have been in one school environment. The researcher and participants' connections will

be observed during empirical material collection. Furthermore, it is also observed that participants know each other prior to the interview.

c. Details of field protocols

In this study, a blended learning modality was used in delivering instruction. Video-conferencing technology, in particular, google meet, was used by both the students and instructor to supplement the modular teaching approach to deliver quality education in this new normal education. Modules were sent to the students ahead of time before the synchronous online discussion so students would be given an idea on what topics to discuss. An online discussion through google meet then follow, discussing module 2 Data Management, which includes sampling, probability, and non-probability sampling techniques. The teacher and students must observe and do the following before, during, and after using video conferencing technology: Check meeting connections ahead of time. Set up online video conferencing connections several minutes before the scheduled conference. Make a communication backup strategy and silence or turn off the phone. By default, it is muted. Avoid interrupting others when they are speaking. As much as possible, avoid distractions. An activity based on the coverage subject will be introduced, followed by the Mathematics Interest Inventory (MII). This is done to assess students' learning, performance, and interest before videoconferencing technology. The researcher will then conduct a Semi-Structured Interview based on the problem statement, and a one-on-one interview was performed using the Google Meet App. The interview was taped and verbatim transcribed. After inspection of the transcripts, ambiguous words were rewritten with simple terms to be understood by the interviewee.

d. Empirical material interpretation and analysis

Themes generation and coding is the most recognized data analysis method in qualitative empirical material. The authors interpreted the raw data for case studies with the help of a four-step interpretation process (PESI). Raw empirical material, from texts to interviews, field notes of meetings, observations, and project reports, was arranged and sorted in NviVo. Since the empirical material from interviews was rich compared to other sources, an in-depth interpretation of the text was first made on interviews. The interpretation process started with the initial coding of sub-concepts, main concepts, and finally, the development of categories. The categories developed from interviews were then triangulated with the observation of field notes and documents. The outcome of empirical material interpretation is presented in a few frames. Figure 1 provides an overview of the empirical material interpretation process followed by the authors' case studies.

e. Conclusion

Before the administration of the online interview, a letter of request was sent to the prospective respondents. The researcher then introduced the study to the respondents and explained the research tools and their purposes. The researcher also oriented the respondents about the appropriate manners and guidelines in the conduct of the interview and explained to them all the questionnaire items individually and thoroughly in the instruction part to ensure valid and reliable results.

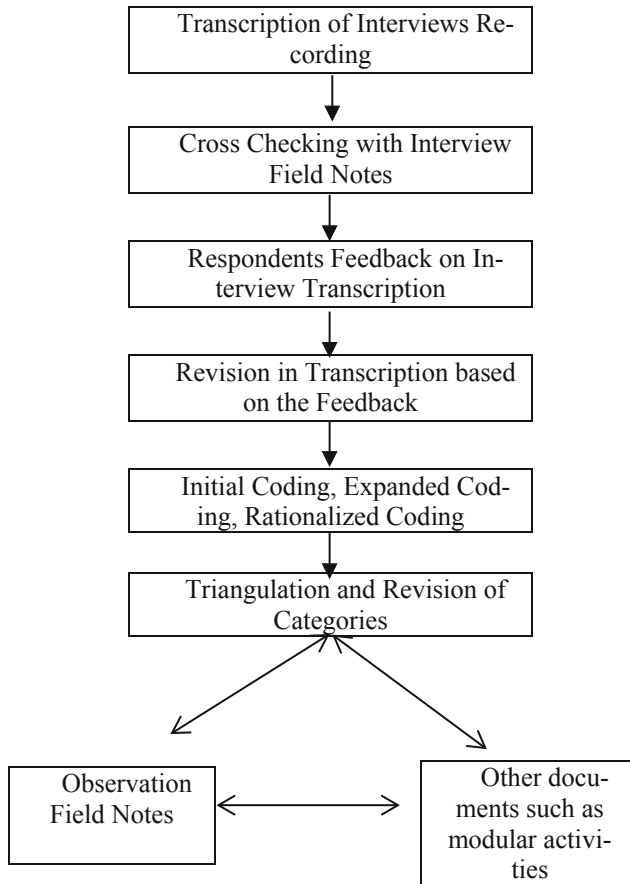


Fig. 1. Empirical material interpretation process

Semi-Structured Interview designed by the researcher was then used as the data collection tool for this study. In this way, the researcher attempts to determine some unobservable mental perceptions, reactions, opinions, and comments of individuals about the research. Interview questions regarding the sub-problems were constructed. During the data collection process, the researcher created an interview form, after which an individual interview was conducted using the Google Meet App. The interview was then started, and everything was verbatim recorded and transcribed with the permission of those involved to prevent data loss and ensure data validity. After reviewing the transcripts, any ambiguous words were replaced with simple terms that the interviewee could understand. Based on the findings, analysis, recommendations, and conclusions were drawn.

3 Findings

The thoughts of the selected nine (9) student participants chosen purposively were classified into four main areas: students' practices, experiences, perceptions, and interests in videoconferencing. These participants are of varying ages, ranging from 21 to 30. Two participants were males, and the other seven were females. These participants also have different civil statuses. Some were single, and others were married. Three of them were parents already with children. The following are the specific descriptions of each participant:

1. Student H1 is a participant with high level of performance and extreme level of interest.
2. Student H2 is a participant with high level of performance and moderate level of interest.
3. Student H3 is a participant with high level of performance and low level of interest.
4. Student A1 is a participant with average level of performance and an extreme level of interest.
5. Student A2 is a participant with average level of performance and a moderate level of interest.
6. Student A3 is a participant with average level of performance and a low level of interest.
7. Student L1 is a participant with low level of performance and extreme level of interest.
8. Student L2 is a participant with low level of performance and moderate level of interest and;
9. Student L3 is a participant with low level of performance and low level of interest.

The information gathered from the first respondent, Student A1s' preparations, experiences, perceptions, and interests in the effects of videoconferencing is highly critical. The first participant's responses served as the foundation for the following data collection processes. The interview questions, verbatim transcripts, and initial coding of the first participant's responses. Before saturation, the researcher used these as a foundation for conducting another interview of the other 8 participants.

Students' Preparations

Student Preparations refer to set of basic practices students do on attending videoconferencing sessions. Based on the information gathered from the interview, the researcher classified three common ideas on their basic practices before attending videoconferencing sessions. These shared ideas include conducting prior research, completing housework and ensuring all necessary resources.

Students' Preparations before Videoconferencing

a. Conducting Prior Research

Prior research entails students doing activities such as reading their modules and handouts ahead of time, reviewing notes from previous discussions, and conducting online research before attending classes. It assists students in preparing for the lesson so that they can participate and respond during oral recitations. Student A1 said, "*I read*

our modules in advance of our online class.” Student L3 added that *“I will make sure that I had prepared myself already. I had taken a bath and was eating while reading my module.”* This result tells that students do the advance study before attending videoconferencing sessions. This finding is consistent with Bassett, Olbricht, and Shannon’s study, in which students demonstrated some basic preparations when attending an online class. Their research found that both reading and watching videos had a significant positive impact on exam scores and that this model was predictive of exam scores. This means that students read and prepare before attending an online class.

b. Completing Housework

Complete housework, on the other hand, implies that students, particularly those with children, complete their housework before attending classes. They are required to complete their housework because they consider housework to be a distraction that may interfere with their learning. Student H3 mentioned, *“I’ll make sure I finish all of my cleaning before going to an online class so I won’t be bothered.”* This affects how they focus on listening and discussing during online classes, so BukSU students had to ensure they finished their housework before attending classes. This finding is somewhat similar to the study “Association between Household Responsibilities and Academic Competencies in the Context of Education Accessibility in Zambia,” which discovered that children in school performed better in domains of adaptive behavior and on assessments of academic achievement (i.e., mathematics, reading). However, when controlling for socioeconomic status, home responsibilities (i.e., chores, work) were a positive predictor of children’s out-of-school performance but a negative predictor of children’s in-school performance. The relationship between home responsibilities and academic performance may be bidirectional and differential; for example, their findings support the hypothesis that chores take time away from studies for in-school children but provide some limited mathematics exposure for out-of-school children.

c. Making Sure to have All Necessary Resources

Six students agreed that before attending online classes, they must ensure that all necessary resources are available, including their cellphone, laptop, desktop, headset, headphones, secure strong internet connection, and, of course, themselves. This is to ensure that the lesson flows smoothly when the class begins; they had to ensure that all gadgets were opened or set up and that they were connected to the wifi. Student L1 said, *“I make sure to have all of my necessary equipment on hand, including my papers, laptop, cellphone, and internet connection. And I should be ready for myself and ready to enter the classroom on time,”* Student L2 added. *“I’ll prepare myself and ensure that my internet connection is adequate before attending an online class,”* Student A2 said *“I’ll set an alarm for my scheduled online classes. Then will make sure that I had eaten breakfast before I attend online class. Of course, I’ll dress appropriately, as if it were a formal occasion,”* Student L3 said that *“I will make sure that I had prepared myself already. I’d had a bath and was eating while reading my module,”* Student H2 cited that *“Because time is so valuable, I have a decent routine. I eat my breakfast ahead of time and, of course, I must be available 10 min before the start of the online class so that I am not late, especially when we have an oral examination,”* Student H1 said that *“I’ll make sure my internet connection is strong, that my devices are completely charged before I*

Table 1. Students’ basic preparations before videoconferencing

Initial Codes	Expanded Codes	Rationalized Codes
Advance study	Advance study	Conducting prior research
Do all tasks	Finish my housework	Completing housework
Prepare cellphone and net	Prepare all online class materials	Making sure to have all necessary resources

use them, and that I’m in an area where I won’t be disturbed.” These results coincide with other research findings that students were making sure all online learning materials are ready when they are about to join videoconferencing sessions.

Table 1 presents the students basic preparations on attending videoconferencing before class.

Students’ Basic Preparations during Videoconferencing

The researcher identified five similar themes based on the replies of the nine selected student participants to their fundamental behaviors during videoconferencing sessions. These frequent themes include taking notes, participating in the discussion, conducting research, asking questions, and paying close attention while videoconferencing.

a. Taking Notes

The practice of taking notes is the systematic recording of information. If students have something written in their notebooks, it helps them learn the lesson and retain critical information, Students A2 stated that *“I’ll take notes, listen, and, of course, participate.”* Also, Student H1 added, *“I’ll take notes and record the conversation so that I don’t miss essential points or concepts and can better understand what’s being said.”* This finding is in accordance with Morehead et al. study on Note-Taking Habits of 21st Century College Students: Implications for Students’ Learning, Memory, and Achievement. Their study found that students still took notes in classrooms, were flexible in their note-taking by using a notebook or a laptop depending on course demands, and frequently chose not to take notes in online courses. As a result, students’ note-taking behavior is adaptable, but they may not always make the best decisions about how and when to take notes. Note-taking by (a) using a notebook or a laptop depending on course demands and (b) often deciding not to take notes in online courses.

b. Participating in the Discussion

Participating in the discussion implies that students learn to enjoy the opportunity to hear the thoughts and ideas of others likewise explore ideas and exchange information. It highly associated with student and teacher interaction. Student A2 said that *“I’ll take notes, listen, and, of course, participate. If I’m asked for my ideas, I’ll gladly share them, and if there are any that I don’t understand, I’ll ask a question.”* This result is analogous with the study Participation in Online Courses and Interaction with a Virtual Agent of Song, Rice and Oh. The result of their study revealed that the frequency and length of course access, the quantity and quality of discussion postings, and the quality of

conversation with the agent were significantly associated with the learner achievement. Their study also identified two factors that comprise online learning participation and interaction: interaction quality and LMS-oriented interaction.

c. Conducting Research

Conducting research is an inquiry-based process that involves identifying a question, gathering information, analyzing and evaluating pieces of evidence, drawing conclusions, and sharing the knowledge gained. The ability to conduct research is a critical skill a student needs to develop to be career-ready. Based on the interview, students do conduct research using the internet while the discussion is ongoing especially when there are concepts that they do not understand they immediately look an answer on the net. Student H3 said, *“I will read as well as conduct research before to my online class.”* This result agreed with other research findings that with the adoption of the online learning modality, students were directed to research on the internet if they had questions, they could not dare to ask their teachers.

Additionally, more and more students are turning to the internet when doing research for their assignments, and more and more instructors require such research when setting topics.

d. Asking Questions

Asking questions means that students were raising some questions because they did not really catch up on what was discussed. Student L1 said, *“During an online class, I will pay close attention to my instructor, the themes, and the lesson; if there are any words or concepts that I do not understand, I will instantly conduct research.”* The result is similar with other research findings that students throw questions when they don’t understand something or they need something.

e. Paying Close Attention

Paying close attention means that students ensure they were in a place out of distractions. It also means to give all students attention to the thing they are doing. Of all responses paying close attention got the highest frequency. The participants stated that there is really a need to pay close attention to online discussions especially in Math because Math is indeed a difficult subject. Student A3 said, *“I’m in a position where I can really listen quietly, so I’m not going to keep asking.”* Student A1 said, *“I won’t allow anyone to bother me while I’m taking an online class.”* Students also showed that they really participate during online classes. Student A2 said that *“I’ll take notes, listen, and, of course, participate. If I’m asked for my ideas, I’ll gladly share them, and if there are any that I don’t understand, I’ll ask a question.”* This result agreed with the other research findings that Math is complex and needs highest attention.

Table 2 presents the students basic preparations during videoconferencing.

Table 2. Students' basic preparations during videoconferencing

Initial Codes	Expanded Codes	Rationalized Codes
Records	Note taking	Taking Notes
Participate	Participate in the discussion	Participating in the Discussion
Share	Share ideas	
Research	Research	Conducting Research
Read	Read notes and modules	
Ask questions	Ask questions	Asking questions
Stay focus	Pay close attention	Paying close attention

Students' Basic Preparations after Videoconferencing

The researcher identified five similar concepts based on the replies of the nine selected student participants to their fundamental practices after videoconferencing sessions. These typical concepts include reviewing notes, relaxing, self-evaluation, doing assignments right away, and asking post-question.

a. Reviewing Notes

Reviewing notes after classes are important for students to make sure that they had taken down all the important things after the classes. Student A2 said *"After that, I'll go over all of my notes that I've taken, and if there are any things or ideas that I don't understand, I'll make a note of them and ask my classmates or my instructor via private message, even if they respond late."* Student H1 also added *"I'll go over all of the PowerPoint presentations that were submitted to me via email."* Research shows that 10 min of review for every hour of lecture, done within 24 h of class, dramatically improves recall. Regularly reviewing class notes is one of the most powerful study strategies.

b. Relaxing

Students also mentioned that they just relax as they felt tired after they face their computers for many hours. Student L3 mentioned that *"I felt fine and was no longer nervous, I stayed relax."* Research shows that some pressure is important to get things done, but too much stress can lead to "burnout." If you can't relax after long hours of studying, you could end up in a permanent state of stress, which could lead to irritability, worry, even panic.

c. Self-Evaluation

Also, students mentioned about having self-evaluation if they really learn the subject. Self-evaluation means that students tried to assess themselves if they learn something after the online discussion. Student A1 and Student H2 said *"After that, I'll make sure*

I'm satisfied and that I've learned," and "Following that, I must ensure that I learned something new from the debate, and I must have the take note with me" respectively.

d. Doing Assignments Right Away

Moreover, some students do their assignments right away so they won't forget it. Results of the analysis revealed that mostly students with children agreed that they had to move fast and finish their assignments right away because they have kids to take care of too. Student H3 said *"When we have things to do after online class, such as assignments, projects, activities, and so on, I'll do them right away so I don't have to rush when the deadlines arrive."* Student A3 added *"I'll do everything that serves as ass/homework right after class."*

e. Asking Post Questions

They tried to ask post questions too if they had things they do not understand. *"I'll ask the class questions if there are any concepts or other things that I'm confused about or don't understand completely"*- Student L2. Student A2 added *"After that, I'll go over all of my notes that I've taken, and if there are any things or ideas that I don't understand, I'll make a note of them and ask my classmates or my instructor via private message, even if they respond late."* Asking post questions help students clarified of the things they doubt and of course improves their retention of learning.

These results are similar to other study findings that students practices during face-to-face and online class does not really differ students emphasizes that they ask post questions whenever they don't understand the discussion well or that they have doubtful concepts.

Table 3 presents the students basic preparations after attending videoconferencing.

Students' Experiences

Students Experiences refers primarily to the nature of students' engagement with teaching and learning through the use of videoconferencing technology. The students' experiences during videoconferencing were investigated carefully. The data analysis

Table 3. Students' basic preparations after videoconferencing

Initial Codes	Expanded Codes	Rationalized Codes
Review	Review notes	Reviewing Notes
Chill	Just relax	Relaxing
Evaluate	Self-evaluate	Self-evaluate
Do task	Do homework immediately	Doing Assignments right away
Ask questions	Ask post questions	Asking post questions

revealed students' good experiences and difficulties encountered during videoconferencing sessions.

Students' Good Experiences on Videoconferencing

There were eight rationalized codes as classified by the researcher based on the responses of the student participants. These good experiences include students experienced an approachable instructors, given recognition, felt true essence of collaboration, can do multi tasks, felt comfortable learning at home, involved, can answer their modular activities, and can contribute to the class.

a. Students experienced approachable instructors

Students experienced feeling welcomed during videoconferencing sessions as they had experienced approachable and friendly instructors, "*we always felt welcomed because we were not afraid when we ask our instructors they were approachable and friendly enough.*" This implies that instructors of the students were open enough to being ask if students have questions, concerns and queries.

b. Students were given recognition

Moreover, students felt welcomed as they were given recognition during meetings. Recognition means to recognize students for their exemplary academic efforts, etc. Student A2 said, "*I felt welcomed since obviously professors are welcoming.*" Indeed giving recognition motivates more the students to learn.

c. Students felt true essence of collaboration

Students also felt the true essence of collaboration with their classmates. Student H3 mentioned, "*I like my online class since my classmates and I assisted each other in joining the class.*" The pandemic had shocked students on the changes of the educational platforms, thus students were found out that they were helping each other especially in manipulating their devices to attend online classes.

d. Students can do multi tasks

It was also found out that student experienced feeling comfortable as online learning saves time, thus they can do multi task while attending videoconferencing. Student H1 said, "*Attending an online class saves time because you can enter into your class with just one click as long as you have an internet connection and you can do other task while on class.*"

e. Students felt comfortable learning at home

Also, students felt comfortable learning at home. Student H1 said, "*You can also stay in the comfort of your own home while attending class.*" It was found out that they were not pressured in terms of physical preparations; even to answer because they were just on their homes.

f. Students are involved

Furthermore, students experienced being involved, as their instructors were much strategized. Student A2 said, "*during online class is that my instructor is very strategic,*

such as doing on-the-spot oral recitation, which I enjoy because I felt rushed and compelled to respond.” Surprised oral recitations had become a very nice strategy during the online learning because it forced students attend to classes.

g. Students can answer their modular activities

Students were able to answer their module. With this videoconferencing, students somehow are supplemented with the modular modality adopted. Student L1: *“I have been able to contribute something to the class, for example, I have been able to participate well in online activities such as oral examinations.”* *“I can respond during an oral recitation, particularly if I have studied.”*

h. Students can contribute to the class

Students were able to participate on online classes. Student L1 said, *“I have been able to contribute something to the class, for example, I have been able to participate well in online activities such as oral examinations.”* Also, Student L2 said, *“When I grasp the issue being discussed and can answer questions and even participate in online activities, I consider it a positive experience.”* Moreover, Student L3 added, *“I consider myself fortunate when I am able to respond to questions.”*

Table 4 presents students good experiences on videoconferencing.

Students’ Difficulties Encountered on Videoconferencing

On the other hand, students difficulties encountered were also being investigated and their responses were classified into these following rationalized codes: students were unprepared, got bored, felt sleepy, were distracted, mentally blocked, don’t comprehend,

Table 4. Students’ good experiences on videoconferencing

Initial Codes	Expanded Codes	Rationalized Codes
Welcomed	Approachable and friendly instructors	Students experienced approachable instructors.
	Acknowledged during meetings	Students were given recognition.
	They have helpful classmates	Students felt true essence of collaboration.
Comfortable	Online class saves time	Students can do multi tasks.
	Learning is just in home	Students felt comfortable learning at home.
Involved	Instructors are very strategic	Students are involved
	Able to answer module	Students can answer their modular activities.
	Able to participate	Students can contribute to the class.

remain in silence, left the meeting, internet connection that goes out unexpectedly, and lack of funds.

a. Students were unprepared

Result of the analysis revealed that some students also felt frightened especially when they do not have prepared for their classes. Student L1 said, *“Yes, I felt intimidated at times since I wasn’t always prepared, for example, I wasn’t present the previous time they had conversations, so I don’t know exactly what they spoke about before, and I don’t know what to talk about now or what to read ahead of time.”*

b. Students got bored and sleepy

Moreover, student felt sense of being bored and sleepy especially listening to a discussion for more than hours. Student L2 said, *“During online class, I felt a mix of emotions such as sleepy, bored, and even distracted because I was thinking about other things to do.”*

c. Students were distracted

It was also revealed that students got distracted by online class and they do not really comprehend. Student L2 said, *“When I don’t really comprehend the discussion until the session is over and I’m distracted.”* This implies that online class for students is quite difficult and hard for them to understand the lesson in Math.

d. Students experienced mentally blocked

Students leave the meeting most of the time. Student L1 said, *“if I am asked a subject for which I am unprepared, I will be forced to leave the topic immediately.”* The students got mentally blocked, and unprepared. When asked to participate, they do not talk rather remain in silence. They do not have all the necessary equipment for online class like cellphone, and a good source of internet connection which goes out all of a sudden. Student A3 also mentioned, *“last year, when the trend of having online classes was established, I found it quite difficult to access my modules and attend online classes due to the fact that I do not have a phone”* and students conduct self-learning.

e. Don’t comprehend

Students find teaching Math online is difficult, thus they said that they do not comprehend much all of the concepts especially when it is solving. *“When I don’t really comprehend the discussion until the session is over and I’m distracted”*- Student H3.

f. Remain in silence

Result of the data analysis also revealed that students remain in silent when they were called by their instructor especially when they do not know the answers. Student L1 said, *“I stayed muted when asked and I don’t know the answer.”*

g. Left the meeting

Student A3 cited, *“Most of the time especially when its noon and the rain started to come, my internet is very low, which resulted to case of leaving the meeting.”* Poor

internet connection affects the way students learn and so they tend to leave and in on meetings.

h. Internet connection that goes out unexpectedly

Student H2 mentioned *“I was about to respond to a question when my internet connection suddenly went off. When I’m running late and won’t be able to respond during the oral recitation or participation.”* Difficulties in internet connection affect students learning. Student H1 added, *“I was in class and the connection was bad, and the topic was crucial, so I missed it since the internet went down unexpectedly.”*

i. Lack of Funds

Lack of funds such as cellphone, laptop, load, internet and others also affect students’ motivation in learning. Student A3 said *“Last year, when the trend of having online classes was established, I found it quite difficult to access my modules and attend online classes due to the fact that I do not have a phone.”*

These results coincide with the study of Widodo (2020) entitled *“From face-to-face learning to web base learning: How are students’ readiness?”*, which shows that students learning readiness in terms of online learning was still lacking. Students experiencing technical obstacles include lack of online media mastery, no training, limited costs, and difficulties in internet connection. Most students expect online learning to stop and come back face-to-face.

Table 5 present students’ difficulties experienced on videoconferencing.

Table 5. Students’ difficulties encountered on videoconferencing

Initial Codes	Expanded Codes	Rationalized Codes
Frightened	don’t have prepared for their classes	Students were unprepared.
	felt sense of boredoms	Students got bored
	sleepy	Students felt sleepy
Distracted	distracted	Students were distracted
	mentally blocked	Students experienced mentally blocked
	don’t really comprehend	Students don’t comprehend
Disinvolved	students are asked to participate, they don’t talk	Students remained in silent.
	leave the meeting	Students left the meeting.
Lacked of resources	Poor internet quality	Students experienced internet connection that goes out unexpectedly
	Don’t have cellphone	Students lack of funds

The poor internet and other online activities resulted to an ineffective learning for students. Student L3: *“Of course, this is ineffective; for example, if I was doing something else while taking an online class and became distracted, I would lose focus on the subject.”* On the other hand, students agreed that online learning experiences are effective but still dependent for students, one says for continuous learning. Student A1: *“I felt effective because, when I evaluate myself, I am in the midst of a learning process.”*

Student H2: *“Yes, I am, especially if the instructor is going to share their experiences as well as discuss the lesson.”* Student H1: *“Yes, it is effective, as evidenced by my improving grades.”*

Students also mentioned that they get sidetracked when anything pops up. They also use Facebook and chat, communicate with other students such as eating and visiting other social media sites, doing personal task, notetaking and doing housework while attending classes.

Also, they had disagreed that those other activities mentioned are not effective for their learning. For instance, Student L3 said, *“not everything we talk about is related to the lessons and it is considered a distraction.”* Student H1 added, *“Because, it is one of the distractions in my studies because my attention is diverted to other things rather than the class.”* Student A2 said, *“No concentration on learning.”* But one student said yes, it is effective because it is one way of coping to the stress of attending online classes. For instance, Student L1 said, *“Maybe because if I don’t eat, my mind won’t function well, such as when we had 3 h classes, and I need to nourish my mind in order for it to function properly.”*

The result of the study is parallel to the study of Famularsih (2020) on Students’ Experiences in Using Online Learning Applications Due to COVID-19 in English Classroom. The investigation showed that most of students considered the utilization of online learning application in English learning are effective and efficient in this emergency situation. However, the obstacles in using online learning application in English classroom were slow-speed internet connection, so many tasks, not all teaching material can be taught through online learning, and lack of interaction between lecturer and student.

Students’ Perceptions of Videoconferencing

Students’ perceptions refer to how students perceive their learning through the use of videoconferencing. Based on the formal interview with the student participants it was revealed that some students are really learning however others don’t learn during videoconferencing.

Students’ Perceptions of Using Videoconferencing

The data analysis revealed four rationalized codes on the perceptions of students learning in using videoconferencing: Learning varies, learning is evident, learning is individualized, and learning is based on sufficient resources.

a. Learning Varies

Learning varies means that students’ perceptions of learning are dependent on his/her level of flexibility. Student L1 said *“sometimes the answer is yes, and sometimes the answer is no. I don’t particularly enjoy math, so it really depends upon students how*

flexible she is.” For instance, the study on “Learning in an Online Format versus an In- Class Format: An experimental study” of Sims and Schuman which findings stated that pretest scores for online students were higher, but posttest scores showed no significant differences in instructional effectiveness. This result emphasizes that learning for students varies depending on their flexibility level.

b. Learning is Evident

Learning is evident indicates that students excellent performance tells them that they are really learning the subject. They can handle oral examinations, can answer during exams, and even participate in any activities.

Student H1: *“I still learned because I can answer questions when there is an assessment,”*
Student H2: *“Yes, I agree that I learnt during oral recitations and the fact that I can answer means that I learned”.*

This result implies that the use of technologies in learning Mathematics help students learn more. This result coincides with the study of Serhan (2020) on “Students Perceptions of Using My Math Lab and Web Assign in Mathematics Classroom”, which revealed that using web-based systems enhanced students’ learning and understanding of the different mathematical concepts. Also, the study “Evaluation of Evidence- Based Practices in Online Learning: A Meta- Analysis and Review of Online Learning Studies” by Means et al. (2010) coincides with these findings that on average, students in online learning conditions performed modestly better than those receiving face-to-face instruction.

c. Learning is individualized

Learning is individualized means that the method of teaching in which content, instructional technology, and pace of learning are based upon the abilities and interest of each learner. The lack of opportunity to socialize in person happened during online

class which makes learning individualized. This makes students introvert as they cannot see people physically when they attend class.

Student H3: *“yes, I can answer questions at that time, but it really depends because I’ve noticed that taking an online class makes a student an introvert because the student is only facing the computer within the four walls.”*

This research findings agreed with other findings that in online class, the physical interaction between students, other students and teachers were limited which result to students learn at their own pace when facing the computer.

d. Learning is based on sufficient resources

Learning is based on sufficient resources implies that the lack of sufficient resources like good internet connection, computers and other online learning materials affects students’ learning.

Student A3: *“I am unable to absorb all of the information in online classes, particularly when I am already behind on our studies due to a lack of access due to a lack of load.”*

This emphasizes that enough resources must be given for students to have effective learning. The poor internet connection was found out to be the most common problems of students that affect their learning. Poor internet affects their focus on the subject.

Student A3: *“for instance our instructor is discussing the most important part of the lesson and the internet goes out all of a sudden.”*

This result agreed with the study of Quinones (2020) on “Students’ Perception of Online Learning during COVID- 19 Pandemic: A Case Study on the English Students of STKIP Pamane Talino.” The study identified three major obstacles in conducting online learning in English Language Education Study Program at STKIP Pamane Talino: availability and sustainability of internet connection, accessibility of the teaching media, and the compatibility of tools to access the media. The result of the current study suggests that accessibility is still the major factor influencing the success of online learning.

Table 6 presents the students perceptions on using videoconferencing.

Advantages and Disadvantages of Using Videoconferencing

It was also found out that students learned better in face to face than online classes. Based on the interview online learning has too many distractions and is challenging, so they wish that face to face will resume soon. Student H2 said *“everything is right alongside with you, making it very easy to discover solutions to queries we can’t answer, Facebook, Twitter, Messenger and others.”* This result agreed with other research findings that students hope that face-to-face learning will resume soon. However, it was also found out that students are also motivated if they have questions as google is right alongside with them and they can interact with each other. This is in contrast with other findings that one of the disadvantages of online class is that no class interaction happened.

The satisfaction on the different Instructional Materials (IMs) used during online classes by instructor were also being assessed. It was found out that students felt satisfied with the learning materials that teacher used, such as the power point presentation

Table 6. Students' perceptions of using videoconferencing

Initial Coding	Expanded Coding	Rationalized Coding
Learning but dependent.	Depends to anyone.	Learning varies.
Introvert	Makes a student introvert.	Learning is individualized.
Yes I'm learning	I can answer during activities.	Learning is evident.
	I can answer.	
	I learn though it's like self-study.	
	I can answer during assessment.	
	I learn because I can answer in oral examination.	
No I'm not learning	What is provided is enough.	Learning is based on sufficient resources.
	No load for internet.	
	When I was behind.	
	I don't like Math.	
	Not perfect way of learning.	

instructors used, as they said the IMs used were just similar with what teacher gave during face-to-face. However, they were also students who were not satisfied. For instance, the use of prerecorded lectures presented in the actual classes sometimes does not go well because they cannot catch up immediately due to background noises and limited time, which leads them to do self-study for themselves to learn. In addition, students also mentioned that online class materials are too many that were stressing them. This coincides with other research findings that students are busy uploading assignments that sometimes cannot be delivered. Many technical matters make it difficult for students. Therefore, it is not surprising that lecturers agree to use the most accessible media for students to follow.

The advantages and disadvantages of online classes were also asked during the interview. It was revealed that videoconferencing advantages are collaborative learning, homebased learning, multi-tasking, and technological skills improvement. On the other hand, its disadvantages include lack of funds, difficulty in virtual classroom management, and less concentration.

Advantages of Using Videoconferencing

a. Collaborative Learning

Online class is a collaborative learning environment. Students, teachers, parents, and even school administrators assist one another in becoming technologically savvy in an online class. *"Students in an online class are motivated because the teacher and*

students assisted each other in joining the class,” said Student H2, implying that there was collaboration in the learning process.

b. Homebased learning

An online class is a home-based learning environment also called homeschooling. It is an educational process where parents or tutors teach children at home, instead of having them formally educated in a public or provided school setting. With homebased learning students feel safe and ease because they are only in their homes. Student H1 said that *“Attending an online class saves time because you can enter into your class with just one click as long as you have an internet connection. You can also stay in the comfort of your own home while attending class.”*

c. Multi-tasking

Furthermore, videoconferencing is extendible, accessible, and suitable. It was a time-saving, short-term multitasking modality because there were plenty of times to study, and it was more accessible to all students. It provided more time for students, and it was less time-consuming. Student H1 mentioned, *“Online classes save time for students whose homes are far from school; instead of going to school they can simply open their phones or computers to attend class.”*

d. Technological skills improvement

It enhances their technological skills by making students tech savvy and teaching them how to use technology. Student H2 said, *“Online classes educate students on how to use technology in today’s society, so students have been exposed to it and must be honed in technological abilities.”*

Disadvantages of Using Videoconferencing

On the other hand, the disadvantages of online classes were also investigated. The data analysis revealed that lack of funds such as poor internet connections, absence of gadgets to use during online classes, etc. Also, virtual classroom management difficulty is another disadvantage of videoconferencing as students during online activities were led to cheat as they can connect anytime outside their virtual classrooms. Also, they have limited time for asking questions and background noise cannot be controlled. Also, no class interaction is another disadvantage.

Disdvantages of Using Videoconferencing

a. Lack of funds

Lack of funds is defined as a deficiency of students in terms of educational resources. This is considered as one of the disadvantages of using videoconferencing. Student A3 and A1 commonly said that *“poor internet connection is a disadvantage.”* Student L2 added, *“The disadvantage is that not everyone can get in or participate in class meetings, especially those without good internet connections or signals.”* Also, Student L2 said that *“learning is tough, particularly when internet access is limited.”* Moreover, Student L1

added, *“poor internet connection, financial issues such as load availability, and student distances where they are unaware that a class is taking place.”*

b. Virtual Classroom Management Difficulty

Classroom management is the process by which teachers and schools create and maintain appropriate behavior of students in classroom settings. Virtual Classroom Management refers explicitly to how teacher manages online classrooms. Virtual management had become a difficulty for teacher during this new normal. Students were found not responsive; Student L3 said that *“in online setting, no one will speak until they are called.”* Student H3 added that, *“You can also sleep while attending classes because the camera is turned off and students tend to cheat by simply copying and pasting their answers because the teacher is not always present to monitor them.”*

c. Less Concentration

As students were exposed online, all their accounts from the devices they used become connected to the net. As a result, it loses their concentration. Student H2 said, *“we get sidetracked when anything pops up, from our Facebook, twitter and even messenger we got distracted and lose our focus to the discussion.”*

The findings regarding the advantages and disadvantages of online classes coincide with the findings of other researchers. Many students feel not ready to take part in learning. The online learning that has been followed so far is the only compulsion. Conditions that make students forced to study online. Students hope that face-to-face learning will resume soon. Many students claim to be depressed because the online model has more assignments. Sitting for a long time in front of a computer or cellphone harms health. Many students complain if they have to read modules given by the lecturers. They admit that their eyes get tired if they have to read on a computer screen for too long. Besides, the level of focus in learning is very different between online and face-to-face learning. Many students admit that the conditions at home are not conducive to studying.

Limited internet quota and difficult internet connection make students miss face-to-face learning more. Online learning costs a lot. Besides, each lecturer uses different online media. This makes students experience difficulties. Moreover, online media is still foreign to students' daily lives. Many of the difficulties faced by students are related to technical problems.

In addition, this result also agreed with the study by Hiranrithikorn 2019 on the Advantages and Disadvantages of Online Learning. Hiranrithikorn discovered that online learning programs were becoming a significant part of higher education learning and training. However, the success rate of learning online without close monitoring was very low. The advantages included low cost, flexible time, and mass audiences, whereas the disadvantages included low success rate, easy distracts, and no class interaction.

Table 7 presents the advantages and disadvantages of using videoconferencing.

Students’ Interests

The effects of students’ practices, experiences as well as perceptions towards students’ interests in learning Mathematics during this new normal education were also investigated.

The data analysis revealed that students’ interests were both positively and negatively affected. Online learning had made students appreciative, optimistic, adaptive and self-reliant. These were four rationalized codes based on the student participants’

Table 7. Advantages and disadvantages of using videoconferencing

Initial Coding	Expanded Coding	Rationalized Coding
Advantages	We were helping each other	Collaborative learning
	can prepare yourself	Home based learning
	can multi task	Multi-tasking
	many time for other activities	
	comfortable to learn home	
	tech savvy	Technological skills improvements
	technology expert	
Disadvantages	internet	Lack of funds
	financial	
	load	
	distance	Virtual classroom management difficulty
	cheating is provident	
	no teacher	
	can sleep while class	
	cannot adjust	
	monitoring	
	lose concentration	

responses on the positive effects of videoconferencing on their interest in learning Mathematics. In contrast, online learning had made students become dependent, pessimistic, disinterested, unmotivated to learn and not focused.

Positive Effects of Videoconferencing on Students' Interests

a. Appreciative

Online learning had made students appreciative. They learn to appreciate that Math is realistic, practical and unavoidable.

Student A1: *"Yes, it has a significant impact on my attitude about learning Math. I used to despise math, but I've grown to appreciate it because it is unavoidable and practical in everyday life."*

This implies that students found more the essence of Math as teachers made use of technology to help students see how concepts they are learning in the math can be applied to everyday life.

Student H1: *"Our instructor in the Business Statistics subject asked us about average text messages sent per day of BSBA students."*

Integrating technology in the math classroom allows students to interact with people outside of the classroom to help broaden their understandings and perspectives about what they are studying.

b. Optimistic

Online Learning also had made students become optimistic. They dislike Math but they try to like it, and they had no choice but love it. This improves their focus, and they continue to do their best to learn. Also, online learning had made them exert more efforts to learn the subject.

Student L3 said *"Yes, ma'am, it has a significant impact because, despite the fact that I dislike math, I continue to do my best to learn because it is still in our best interests,"*
Student H1: *"Yes, it has an impact because math requires concentration, especially for students who dislike math."*

Students are not always learning with the teacher alone now that it is a pandemic, and because Math is a difficult subject, students were shown to have put in more effort to pass the subject. This was determined by their responses to their modular activities.

c. Adaptive

Moreover, online learning made students adaptive as they are being aware of what is new, embrace the new normal education, and adapt to the new set up. Online learning had prepared them to adapt to changes.

Student H1: *"Yes, it has an impact on our interests in a variety of ways, so I need to be more aware of what is new,"*

Student H3: *"No ma'am, because I had already adjusted what is new normal now."*

Whether students dislike the method of teaching Math using virtual classrooms, they do not have a choice to change it but to adapt to the transitions of educational changes.

As Student A1 said, *“Because we don’t have a choice, it has a significant impact on me. So, if we truly want to learn, we must embrace the new normal rather than abandon our education.”*

The result of the study findings is in contrast with the study “Adaptability to Online Learning: Differences across Types of Students and Academic Subject Areas Xu and Jaggars.” Their study examines how well students adapt to the online environment in terms of their ability to persist and earn strong grades in online courses relative to their ability to do so in face-to-face courses. While all types of students in the study suffered decrements in performance in online courses, some struggled more than others to adapt: males, younger students, Black students, and students with lower grade point averages. In particular, students struggled in subject areas such as English and social science, which was due in part to negative peer effects in these online courses.

d. Self-Reliant

Lastly, online learning enables students to become self-taught and self-reliant. Students were taught to be self-learners through online learning. Because face-to-face meetings were not permitted at the time, students met online for a limited time. The new normal education then allows students to explore more independently. The result of the analysis is similar to the study of Sit, Chung, Chow, and Wong in 2005 on the “Experiences of Online Learning: students’ perspective.” Results of their study revealed that online learning was seen to be convenient allowing students to study at their own pace and time. Students reported that online learning enabled them to hold a higher level of accountability for their own learning and to learn independently. Not all experiences were positive. A major hindrance to online learning was the inadequate opportunity for human interaction which was deemed necessary for establishing peer support and developing in-depth group discussion on subject matter.

Table 8 presents the positive effects of videoconferencing on students’ interest in learning Mathematics.

Negative Effects of Videoconferencing on Students’ Interests

a. Dependent

On the other way around, online learning had made students became dependent to others. Student A3 said, *“Yes, it influences my attitude toward learning, especially when the deadline is still a long way off; students prefer to rely on their classmates for information, which makes a great difference, especially if you don’t care for the Math topic being discussed and have no one to question.”* This result is in contrast to the study findings of Bubb & Jones on “Learning from the COVID 19 Home Schooling Experience: Listening to pupils, parents/careers and teachers.”

Their findings stressed out that there was more creative learning, better progress, more useful feedback and greater student independence. Because teachers’ considerations have waned during this new normal, cheating has become a more common problem. Students became reliant to others, including classmates, friends, and even their parents. This is based on their performances in their modular activities. This result agreed with the news Distance Learning program gives rise to online cheating by Bautista on September 2021. With the current setup of blended learning due to the pandemic, students have

Table 8. Positive effects of videoconferencing on students' interests in learning mathematics

Initial Coding	Expanded Coding	Rationalized Coding
Realistic	Math is realistic.	Appreciative
Practical	Math is practical.	
Unavoidable	Math is unavoidable.	
Try to like Math	I dislike Math but I trying to like it.	Optimistic
Try to love Math	I had no choice but still love it.	
Made me concentrate	Math improves my focus and so it requires concentration.	
Continue to learn	I continue to do my best to learn.	
Aware what is new	I must be aware what is new.	Adaptive
Adjust what is new normal	I must adjust to what is new normal.	
New to changes	I am new to the new normal set up.	
Self-learners	Enables us to become self-taught	Self-reliant
Independent in answering	We answer on our own	

resorted to online cheating via a Facebook group where they share notes and test answers. The “Online Kopyahan” community had at one point more than 600,000 members, but after a local television report aired on Friday, the now-archived Facebook group was left with 571,900 members.

b. Pessimistic

Indeed, Math is a difficult subject students found Math more difficult during this online learning, they become more pessimistic.

Student A2: *“Yes ma’am, because I really not into Math, I find it difficult when it was face to face, so how much more it’s not,”*

Student L1: *“Yes, ma’am, because teaching Math using an online platform is difficult, and whether a student enjoys the subject or not will determine whether or not he or she succeeds,”*

Student H1: *“Because the teacher in an online class simply gives instructions without taking into account how difficult Math is, students feel as if they are not learning at*

all,” “It is preferable if Math is taught in a practical manner, such as problem solving, because it is difficult.”

This finding is similar with the research findings of Almarashdi Mathematics Distance Learning amid the COVID 19 Pandemic in UAE: High School Students’ Perspectives that students showed no preference for choosing to study mathematics by distance learning in the future, if given a choice.

c. Disinterested

Also, result revealed that instructors only give instructions, thus students became more disinterested. This result coincides with the study of Almarashdi Mathematics Distance Learning amid the COVID 19 Pandemic in UAE: High School Students’ Perspectives. Results revealed that students’ most negative perceptions were about missing the interaction with teachers and colleagues, and disapproving of the unfavorably long screen times.

e. Unmotivated

Moreover, online learning makes students unmotivated to learn in their Mathematics class.

Student L1: *“It’s as if I was forced to learn the subject; I don’t particularly enjoy math, but I have to follow the rules due to various government restrictions, and thus I must maintain interest in the subject.”*

Student A1: *“Because we don’t have a choice, it has a significant impact on me. So, if we truly want to learn, we must embrace the new normal rather than abandon our education.”*

This implies that students’ interest during this pandemic had really changed a lot they thought that the submissions to all their subject requirements were made only for compliance to pass the subject. For students, the new normal education forces them to comply the subject rather than truly learn, force them to adjust to new situations but made them become self-learners. They have difficulty in complying mathematics requirements. Student A3 said, *“Because it is an online class, we assumed that as long as we completed all of our subject requirements/activities, we would be fine. As a result, our attention begins to wane because it appears that we are being forced to comply rather than truly learning the subject.”*

The instructor’s online requirements found that students were more concerned with finishing everything on time than with learning the activities. They indeed became unmotivated to learn. This result agreed with the NASFAA Staff Reporter, Daugherty, on his reports “Students Face Obstacles, Lack of Motivation in Transition to Remote Learning amid Pandemic, Report Finds.” It was cited that as students across the country gear up for

a fall semester that will look much different than in previous years, a new report identifies the lack of motivation for remote learning as the biggest obstacle for undergraduate, graduate, and professional students during the pandemic.

f. Not focused

Furthermore, students became not focused, they had rather be working on something else besides mathematics, and they stressed out that videoconferencing/ online learning is less stressful than face to face. As Student H3 said *“because online classes, unlike face-to-face classes, do not have everyone set up, they have a significant impact on my interest in learning math. Online classes are simply too relaxing.”* They were not focused on their studies rather, they find jobs instead of giving enough time to attend online classes and even answer their modules. Student A3 mentioned *“also, some are working part-time jobs, and learning enthusiasm has waned because we assumed that submitting the needed requirements would enough.”*

The result agreed with the study of Bringula et al, 2021 on Mathematics Self Concept and Challenges of Learners in an Online Learning Environment during COVID- 19 Pandemic. Result of their study found that students were personally challenged further technologically, domestically, assessment, pedagogically, consultation, and test anxiety challenged. Specifically, students’ difficulties in terms of personal challenges include lack of focus, they procrastinate and they showed less productivity.

Table 9 shows the students’ negative effects of videoconferencing on students’ interest in learning Mathematics.

4 Summary, Conclusion, Recommendations

4.1 Summary

The study aimed to investigate the effects of videoconferencing on students’ interest in learning Mathematics during this new normal education at Bukidnon State University Kitaotao Campus (BukSU Kit Campus) during the S.Y. 2021–2022. Specifically, this study aims to identify the students’ practices in videoconferencing, discuss students’ experiences during videoconferencing, describe how they perceived their learning during videoconferencing, and explain how students’ practices, experiences, and perceptions affect their interest in learning.

The respondents of the study were third-year Business Administration students at BukSU Kit Campus. Three questionnaires were used: the Mathematic Interest Inventory (MII), Modular Activity Sheet, and the researcher-made Interview Protocol. This study used purposive sampling to determine the participants, wherein the MII was used to determine their level of interest, and the activity sheet tools were used to determine their level of performance. After the 9 participants were selected, they underwent a one-on-one interview with the researcher.

NviVO was used to analyze the data gathered using initial, expanded, and rationalized codings. Content analysis was further used to analyze more of the data.

The study’s results revealed that students have prior knowledge about videoconferencing. Moreover, students’ basic practices before attending videoconferencing sessions

Table 9. Negative effects of videoconferencing on students’ interests in learning mathematics

Initial Coding	Expanded Coding	Rationalized Coding
Deadline is stringent	Deadline is long way off.	Dependent
Makes us dependent	Students are dependent.	
Teacher is not there to ask queries	No one to ask question.	
Rely on classmates	Used to rely on classmates.	
Parents are involve in answering	Parents answer activities.	
Math is difficult	Math is difficult in face to face.	Pessimistic
Problem solving are difficult	Problem Solving are difficult.	
Hard to understand	Difficult to comprehend.	
Must be applicable in real	Math must be taught in a practical manner.	
Discussions is limited	Instructors only give instructions.	Disinterested
Force to learn	Students must learn whether they like it or not.	Unmotivated to learn
Don’t like the subject	I don’t like Math.	
For Compliance	We must work because it is required.	
For Compliance	As long as we had completed our subject requirements.	
For Compliance	Thought it’s all for compliance.	
Challenge	Challenge to keep learning effective.	
Pay attention	Attention begins to wane.	
Not pressured	Made me not pressured at school works. Online Class simply too relaxing.	Not focused.
Part time jobs	Made me look for part time jobs.	
Needs focus	We have to pay attention.	

include conducting prior research before an online class, completing housework first, and ensuring all necessary resources are ready. Also, students’ basic practices during videoconferencing include taking notes, participating in the discussion, conducting research, reading, asking questions, and paying close attention while videoconferencing. Moreover, students’ basic preparation after attending an online class includes reviewing notes, relaxing, self-evaluation, doing assignments right away, and asking post-questions.

Furthermore, students’ good experiences include: experienced approachable instructors, were given recognition, felt the true essence of collaboration, can do multi tasks, felt comfortable learning at home, being involved, can answer their modular activities

and could contribute to the class. On the other hand, their difficulties experienced include being unprepared, getting bored, feeling sleepy, being distracted, mentally blocked, not comprehending, remaining in silence, leaving the meeting, experiencing internet connection that goes out unexpectedly, and lack of funds. The students also agreed that they felt welcomed and frightened and got bored and sleepy during online classes. Other activities that the students do while having an online class include: getting sidetracked when anything pops up; using Facebook and chat; communicating with other students such as eating and visiting other social media sites; doing personal tasks; notetaking; and doing housework.

The students' perceptions toward online classes include learning varies, individualized, evident, and dependent on resources. Students perceived that they learned during online classes, as they could handle oral examinations, answer questions during exams, and even participate in any activities. It was also revealed also that online classes motivate students to learn; they are time-saving and hone technological skills. On the other hand, poor internet connection, students tend to cheat, limited time for asking questions, losing connection, still self-learning, background noise, inability to frame questions immediately and being closely watched are its disadvantages.

Students' interests during this pandemic had changed a lot and had been positively and negatively affected. The positive effects of videoconferencing on students' interests include being appreciative, optimistic, adaptive, and self-reliant. On the other hand, being dependent, reliant on others, pessimistic, disinterested, unmotivated to learn, and not focused are adverse effects of videoconferencing on students' interest in learning Math. They thought the submissions to all their subject requirements were made only for compliance to pass the subject. They were not focused on their studies but found jobs instead of giving enough time to attend online classes and even answer their modules. For students, the new normal education forces them to comply with the subject rather than truly learn, forcing them to adjust to new situations but making them self-learners.

4.2 Conclusions

The following conclusions were drawn based on the findings of this study:

Before videoconferencing was implemented, students had a basic understanding of what it was. Apart from the modular activities, they had made an effort to attend an online class to supplement their learning. Students' preparations before videoconferencing include conducting prior research, completing housework, and ensuring all the necessary resources. Students' preparations during videoconferencing include taking notes, participating in the discussion, conducting research, reading, asking questions, and paying close attention while videoconferencing. After videoconferencing, students' preparations include reviewing notes, relaxing, self-evaluation, doing assignments right away, and asking post-question questions.

Students' experiences varied; they each had unique experiences, but they all agreed that taking an online class saves time, but the poor internet connection is a major drawback. These good experiences include students' experiencing approachable instructors, being given recognition, feeling the true essence of collaboration, doing multi-tasks, feeling comfortable learning at home, being involved, being able to answer their modular activities, and contributing to the class. On the other hand, students' difficulties were

being unprepared, getting bored, feeling sleepy, being distracted, mentally blocked, not comprehending, remaining in silence, leaving the meeting, internet connection that goes out unexpectedly, and lack of funds.

Although students believe Math is challenging to learn without a teacher, they continue to learn during online classes. The students' perceptions of learning include that learning varies, is evident, is individualized, and is based on sufficient resources. The advantages of videoconferencing were collaborative learning, home-based learning, multitasking, and technological skills improvement. On the other hand, its disadvantages include lack of funds, virtual classroom management difficulty, and less concentration.

Because of the abrupt transition in the educational process, the students' interests shift dramatically and are both positively and negatively affected. They were on the verge of losing interest because they believed that submitting the required requirements was sufficient to pass the subject. Some become appreciative, optimistic, adaptive, and self-reliant. On the other hand, some students become dependent, pessimistic, disinterested, unmotivated to learn and not focused.

4.3 Recommendations

The study's conclusion led to some recommendations that are thought to improve mathematics teaching and learning, resulting in improved student mathematics performance.

Students' mathematical interests and learning were vital, and because learning never stops and is always ongoing, improving various learning environments will help learners adapt to various situations in the future, such as a global pandemic that necessitates a shift in the teaching and learning environment.

Based on the conclusion of this study, the following recommendations are drawn:

The teacher must inform students about the basic preparations at the beginning of the course in order for students to be disciplined and organized when attending online classes, resulting in a smooth flow of discussion.

In addition, to make students' learning experiences more meaningful, the teacher must encourage virtual collaboration and student participation. Teachers must not lose sight of the most important aspects of the lesson plan in order to motivate students before class, acknowledge them throughout the day to keep them motivated and be more strategic as a teacher to keep students engaged.

Moreover, the government must devote sufficient resources to technological support so that students can learn more effectively and advance to the level of students in other countries. Also, encourage students to research the subject using various platforms. In addition, more effort should be put into selecting various instructional materials to make math more effective; educators should develop their classroom management skills not only in face-to-face classrooms but also in virtual classrooms. The school's internet connection and the Philippine internet system must be improved for continuous and practical learning. Also, teachers' communications with their students must be closely monitored, and online class materials for students to answer should be limited.

In addition, further studies may be conducted to validate students' interests with a high number of respondents for more validity and reliability of the study which may yield significant results.

Academic shifts were new to everyone, and they were unprepared to transition from face-to-face classes to virtual, modular, and flexible learning environments. This topic will provide an opportunity to delve deeper into the subject to advance and improve teaching and learning. As technology advances for the benefit of more significant learning, new concepts, strategies, and techniques appropriate for diverse learners may emerge in online learning.

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