

Learning Experiences of College Students in Mathematics in the Modern World during Synchronous Classes

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Abstract: *This study explores the learning experiences of college students in Mathematics in the Modern World during synchronous classes. The research participants were the AB-PolSci students from Saint Columban College, specifically the first-year students who are officially enrolled at the beginning of synchronous classes during the academic year 2021-2022. A single-case study was utilized. This study is supported by the gathered data from the interview guide questions answered by the 1st year AB-PolSci students. It was found that research participants encountered difficulties in learning Mathematics in the Modern World during synchronous classes using a platform, google meet, which leads to complications in delivering the lessons while making their performance tasks during online classes. It also showed that the participants had their strategies to learn Mathematics in the Modern World by watching YouTube videos and reading the provided materials in the Google Classroom. The participants identified the following challenges: difficulty in answering their worksheets, slow internet connection, lack of intrinsic motivation, and difficulty in learning Mathematics in the Modern World. The participants' adjustments pointed to acceptance of the current situation and sought assistance from classmates, friends, and the internet to cope with those challenges.*

Keywords— *Learning experiences, Mathematics in the Modern World, and synchronous classes*

INTRODUCTION

The world has been altered by the COVID-19 pandemic. It operates to harm a person's respiratory system and presents a serious risk to the general public's health (WebMD, 2021, as cited in Cantanero et al., 2022). The COVID-19 pandemic has impacted nearly every facet of society. The educational sector has been affected especially hard (Tria, 2020). In reaction to the COVID-19 outbreak, lockdowns and other limitations on social mobility have disrupted the regular school day with national school closures (Viner et al., 2020, as cited in Ramirez et al., 2022). Most nations throughout the world have temporarily shuttered educational institutions to contain the COVID-19 pandemic and reduce infections, according to UNESCO (2020).

As a result of the closure of schools, colleges, and universities, over 28 million Filipino students at all academic levels are forced to remain at home and follow the Philippine government's quarantine measures. With limited time to gather resources and up-skill teachers, schools must make binding judgments on how to enable this effectively. According to international and national studies done early in 2020, teachers were worried when negotiating these changes and were concerned that pupils' academic and social requirements were not being satisfied (Flack et al., 2020).

Mathematics in the Modern World

Modern society places a high value on mathematics. It provides the crucial foundation for the understanding of economy. It is crucial in many ICT fields as well as the physical sciences, technology, business, and financial services. Additionally, it is becoming more significant in the fields of biology, medicine, and many social sciences. The majority of scientific and industrial research and development is based on mathematics. Mathematical inputs and outputs are used extensively in the design and control of high-technology systems, and an increasing number of complex systems and structures in the modern world can only be understood using mathematics.

Mathematics in the Modern World is defined as "a course on the nature of mathematics, awareness of its practical intellectual, and artistic dimension, and application of mathematical instruments in daily life" (Commission on Higher Education, 2013, P.6). Its studies number, structure, space, and problem solving, necessitating mathematical and critical thinking abilities (Kusmaryono et al., 2020). Mathematics is regarded as one of the most challenging disciplines to master worldwide due to its complexity and abstract nature (Azizah et al., 2019). Ariyanti and Santoso's study (2021) discovered that the average student's positive response to mathematics is higher before online learning than after online learning.

Synchronous Classes

In this pandemic, where the learning mode is no longer face-to-face, teachers, especially mathematics teachers, must be competent in using technology in the new teaching and learning modality. With regards to this, there were concerns that learning mathematics away from the school environment may undermine inquiry-based approaches to learning mathematics in several ways.

Sullivan et al. (2020) point out that explicit explanations followed by repeated practice are conducive to the use of video technology, particularly instructional videos that may be prepared ahead of time and shared via a web link. Inquiry-based approaches to learning mathematics, on the other hand, necessitate student-centered, mathematically rigorous discussions centered on students' experiences working on problems. Such post-task discussions allow teachers to draw attention to linkages between mathematical ideas (Stein et al., 2008) and enable students to benefit from one another's tactics (Russo & Hopkins, 2017). A synchronous in-class facilitator is likely required for such a discourse-intensive approach to learning mathematics. Another possibility is that teachers may anticipate or respond to (potential) negative attitudes toward mathematics and mathematics learning held by some adults in the home environment. Thus, be less willing to pursue open-ended tasks that require students to take risks or navigate the "zone of confusion" (Clarke et al. 2014).

Furthermore, the challenges students face when participating in online learning include the issue of the lack of instructional materials on how to solve the problems given by teachers. In turn, students may feel less capable of learning the online mathematics materials at their own pace. Furthermore, the interconnected learning process that requires mastery comprehension of the previous topics causes students to struggle throughout Mathematics in the Modern World lesson.

Students faced difficulties as they transitioned from face-to-face to online learning systems. To switch to an online learning platform, students need a device, Internet access, a physical learning area, and a strong sense of learner autonomy. Device ownership is a constant barrier to the efficient adoption of online learning due to the digital divide. Intermittent Internet access impedes effective online learning in underdeveloped nations (Salac & Kim, 2016).

Another issue for pupils is transitioning from a classroom to a home learning environment. Noise and other distractions may disrupt students who do not have access to a unique physical online learning environment (Baticulon et al., 2021; Bringula et al., 2021). The teaching method also changed. There are portions of the syllabus that students must learn on their own (i.e., asynchronous sessions)—tasks that may not be possible to practice in a face-to-face setting. Students' capacity to learn and study course content during asynchronous sessions is challenging for online students.

Method

The study used Qualitative Research Design as it described the experiences, interpreted meanings, and understood concepts. It utilized the Single Case Study Research Method. It attempted to understand the individual's behaviors and attitudes (Ortiz, 2006, p. 31).

The participants of this study are the 1st year AB-PolSci students who are suitable for identifying the learning experiences in learning Mathematics in the Modern World during synchronous classes and who are under the College of Teacher Education, Arts and Sciences Department in the academic year 2021-2022. Their corresponding teacher in Mathematics in the Modern World was also involved and stood as the second source of data.

To realize this study, the researchers wrote a letter and asked permission from the Dean of College of Teacher Education, Arts and Sciences, Dr. Marion F. Alayon, to survey the first-year AB-PolSci students of Saint Columban College Pagadian City as respondents.

Upon approval, the researcher informed and asked the participants about the study's nature and purpose. Triangulation of data had been applied in this study to make sure results are well supported. The researcher has administered Interview Guide Questions to the participants. The Interview Guide Question for the participants and their teacher was well-validated before dissemination as data sources. The researcher personally administered the instrument to the participants to encourage them to answer the questions wholeheartedly. The research participants are instructed to answer each question in oral form through google meet. During the process, there was an Audio Recorder to document every word that will stand as evidence for the vitae. The audio recording of the whole process of the interview was under the approval of the research participants. It was also stated in the Informed Consent that was given before the said interview.

In the said model, the triangulation of data is emphasized. The purpose is to establish a relative position towards two or more points using different sources of data. Triangulating measures from various sources strengthens the validity of a study by countering bias that may arise from a single effort and contributing to establishing facts (Beverland & Lockshin, 2003). Moreover, data sources triangulate to understand the convergence of information, interpretations, and perceptions, thus checking the study's validity and reliability (Hammersley, 2008).

Results and Discussion

Teacher's delivery of the lesson

The group participants described how their teacher's delivery of lessons during synchronous classes, and it formulated two themes: lessons are related to real-life situation and complications in delivering the lesson.

Lessons are related to a real-life situation. Most of the participant's responses are the same. They really relate the lesson to a real-life situation.

We like our teacher because she relates the topic to real-life situations every time she conducts classes for us, like how to manage money, especially for students far away from their families and who only rent a room near campus/school. (GP4)

Our teacher is good in terms of applying mathematics to the real world. She teaches not only about for the sake of studying but also for application on a day-to-day basis. I cannot mention which particular lesson she associates in mathematics, but I had listened enough. I can say that it's not all about theories or equations that she fed to us but also apply to each of us. (GP1)

Even the teacher mentioned that she relates her topic to a real-life situation.

I relate our topic to the real-life situation by sharing that, in life, we have the problems that we face, but like math problems, there is a process to solve them step by step. And also, seeing the situation we are in right now, it is essential to know the value of the money and how to save expenses for their daily needs. Teacher

Mathematics is a fantastic tool for defining the nature of natural events and their relationships. "Embedding mathematics within the context of the learner is crucial to the creation of a meaningful relationship between personal beliefs and meaning-creating processes," according to Moellwald (1997). Connections and experience, according to Dewey, were the most important aspects of education, and the following elements were important in his curriculum theory: "the interests and learning capacities of individual children, the child's life history of experience, a generalized, scientific method of inquiry, various types of subject matter, the social context, and democratic values" (Shield, 1997).

Complications in delivering the lesson. Most of the participants are having a hard time listening and understanding the teachers' delivery of the lesson.

Sometimes our teacher is too fast in discussing the lesson, and I am ashamed to complain because I feel that maybe I am the only one who finds her discussion to be so, but then, later on, I discovered that my classmates also noticed it. (GP2)

For me, it is boring because I am the type of person who wants to be always acknowledged. I like oral recitation because I can learn better through oral. Still, our teacher doesn't always give oral recitation, which is an advantage for those students who are not comfortable with oral recitation but for me, it is a disadvantage. (GP3)

The length of listening and the quality of recorded materials were identified to be the most difficult aspects of listening comprehension by Gilakjani (2016). However, previous research has primarily looked at external elements that occur while listening. Other researchers look into the listener's internal aspects as well. According to Renukadevi (2014), the listener's concentration has become a big issue in listening. Lack of concentration is regarded as a severe issue because even a brief lapse in attention can seriously hinder comprehension. Furthermore, Hamouda (2013) discovered that problems with listening comprehension are linked to students' concentration and motivation. These issues indicate that students have some difficulty understanding what an English speaker is saying.

The teacher was also asked about the student's response to her delivery of the lesson in Mathematics in the Modern World during her classes. Below is her response.

Well, they're pretty attentive, but as to assessing 100%, if they are attentive, I can't evaluate them. Mainly, I do not require the students to open their cameras while having my classes, so I cannot assess by looking at their faces if they are attentive. But, sometimes, when I call their name, some would respond, but others take longer to react and open their camera and microphone, and sometimes when I call their name, they leave the class quickly. Teacher

Strategies of the students in learning Mathematics in the Modern World during synchronous classes

The group participants provided the following responses about their strategies in learning Mathematics in the Modern World during synchronous classes, and two themes emerged. These themes are watching videos on YouTube and reading the provided materials in Google Classroom.

Watching videos on YouTube. Most of the research participants watch videos on YouTube as one of their strategies to learn Mathematics in the Modern World during synchronous classes.

In my case, I would watch some videos related to the lessons on YouTube because I am too embarrassed to ask my teacher during class if I have any questions. If we try to reach out to our teacher privately, she may not respond to us because she is also busy, so I tried to understand the video on YouTube even if it was difficult to understand. GP1

I would refer to the YouTube links that our teacher provides. Still, sometimes the videos she gives are a bit complicated and hard to understand, so I would try to find some sources and points of view in that lesson, and then I could probably say that I already understand it. GP4

Our teacher's example is sometimes very easy, but I feel it's different when it comes to the worksheet. The worksheet she gives us is a bit complicated, making it difficult to understand and answer; therefore, I'll go to YouTube and look for videos related to our lessons, which I will then watch and immediately understand how to get the answer. YouTube is a tremendous help, especially in math subjects. GP 3

Most of the group participants are having a hard time understanding the topic that has been discussed by their teacher, and according to them, some of the worksheets that are given are complicated. They compare it to the example that has been discussed, and they feel that the example is just easy to understand, but the worksheet is difficult. So, as a result, they find other sources or links on YouTube for them to watch and understand properly.

YouTube primarily develops knowledge and provides multimedia education. Lindstorm (1994) discovered that learners' recall and comprehension capacities enhance when they have a whole experience, that is, when they see, hear, and do. Below is the response of their teacher in Mathematics in the Modern World. The teacher was also asked about the strategies of the students in learning Mathematics in the Modern World during her class. Below is her response.

I think one of their strategies is to base an example they can see or find on YouTube because some students learn better on YouTube, and if they become confused, they can use the reverse button or search for other sources that are still available on YouTube. Since they rarely ask me questions during our class sessions, maybe because they are embarrassed to ask their classmates or me. Teacher

When students see, hear, and produce materials during instruction, their comprehension level is higher than 75%, compared to 20% for learners who only understand during preparation and 40% for those who see and hear solely during instruction (Lindstrom, 1994). As previously said, YouTube video is an alternate medium for language training that provides audio-visual content.

Reading the provided materials in Google Classroom. This is one of the prevalent answers of the research participants on their strategies learning Mathematics in the Modern World.

I will do my best to understand the PowerPoint that our teacher provides. Then I will try solving it by myself, scrutinize the pattern that our teacher made in her equations and solutions, and later create something like the worksheet for my own to practice. GP3

I will thoroughly read the materials provided by our teacher in our Google Classroom. Because our teacher would post materials in our Google Classroom before or after our class in Mathematics in the Modern World that we would read, and in that material, there are numerous examples with comprehensive solutions. So, if I had worksheets or exams to complete, I would go back to the material and most likely base my answers on her examples to make them easier to achieve. GP4

Since I am too embarrassed to ask our teacher if I have any concerns about the topic during class, I prefer to study the materials repeatedly and then rely on her examples to help me comprehend them better. So, it's a matter of hard work. GP1

The response of their teacher supports the above-mentioned responses. The teacher revealed that one of the strategies of her students in learning their topics is to go back to their Google Classroom and read the materials that she has provided.

Another strategy is that I believe they refer back to the lessons, specifically the PowerPoint presentations I provide in our Google Classroom. Students have asked me why my worksheets differ from the example I gave and discussed with

them during class discussions. According to them, my examples are easy to understand, but my worksheet is a bit complicated. So, I think they are comparing. Teacher

The usage of Google Classroom as a learning tool is part of a larger effort to use technology to aid instructors and students in the learning process (Ocampo, 2017). Lecturers can submit materials on the subject being taught in Google Classroom. Lecturers can upload teaching materials, offer tasks to students, and upload student scores so that they can see the results of the course right away.

Difficulties encountered by the students in learning Mathematics in the Modern World during synchronous classes

The participants provided the following responses about the difficulties they encountered in learning Mathematics in the Modern World during synchronous classes, and two themes emerged. These themes are difficulties in learning Mathematics in the Modern World during synchronous classes, difficulties in answering the worksheets, and difficulties with slow internet connection.

Difficulties in learning Mathematics in the Modern World. Most of the research participants experienced difficulties in learning Mathematics in the Modern World during synchronous classes.

I can't ask questions to our teacher, and on YouTube, even if it was discussed, I still need time to understand it, especially since I'm not good at math. I can understand, but I can't get the topic right away, and if I ever have a question, I can't get a direct answer because we don't have group chats that our teacher creates. She only just discussed it. GP2

I can't communicate with our teacher to clarify some things, like I need to work on myself to understand the topic, although once I get it or understand the topic, I can say it is easy. But, at a certain point, there will be a weakness that occurs before I can understand the topic since it's hard reaching our teacher through any means of communication. GP1

According to a study conducted by Perez (2001), one of the biggest disadvantages of distance education is the lack of human interaction between the instructor and students. Students sometimes do not have the opportunity to meet with their instructor face-to-face in online learning environments, which makes it difficult for students to ask questions, engage in meaningful and relevant discussions, and communicate non-verbal signs with the instructor. One of the biggest disadvantages of online learning settings is the lack of interactive learning possibilities available (Perez, 2001).

The teacher was also asked about the difficulties encountered by her students in learning Mathematics in the Modern World. Below is the teacher's response.

One of the difficulties is their motivation and lack of this intrinsic motivation, especially since they're at home. No one will reprimand them if they lie in bed while having class, scrolling on Facebook, watching movies on YouTube or TikTok, and their camera is off, so there is a tendency that they will fall asleep in class. So, no one will check them if they listen carefully. There are also circumstances in their houses that are out of the teacher's control. Teacher

According to Husman and Lens (1999), students who are very intrinsically driven might also be extrinsically motivated in terms of future goal orientations. Furthermore, pupils that are intrinsically motivated persevere longer, overcome more hurdles and achieve more academically than children who are extrinsically motivated (Pintrich & Garcia, 1991).

Difficulties in answering the worksheets. Most of the research participants experienced difficulties in answering the worksheets in Mathematics in the Modern World during synchronous classes.

Math is a challenging subject, so it needs to be discussed on the board compared to the internet because we can understand better and follow what is written step by step on the board, and then we can ask questions if ever we are confused from the solving. GP4

It is challenging to answer since sometimes the worksheet looks difficult to answer. Unlike in the discussions, the examples seem like it is easy, and so what we understand and what we need to answer don't coincide. And it needs to ask a face-to-face question and get a direct answer from our teacher. GP3

The group participants also raised a pedagogical issue. Understanding the course topic was rated as a personal barrier (Baticulon et al., 2021; Famor et al., 2022). Based on interviews with group members, this is the majority of the time. They claim that understanding themes in online learning is tough since math is a challenging subject that requires face-to-face interaction. They

prefer to go over things step by step on the board and then ask questions if they get stuck. It is because they do not fully get the conversations that they are having difficulty answering the worksheets.

The teacher was also asked about the difficulties encountered by her students in answering the worksheets in Mathematics in the Modern World. Below is the teacher's response:

A few students experienced difficulties answering their worksheets, but some could answer directly. Because there are instances where I ask them if they have questions or clarifications regarding my topic or discussions, they don't even respond because they seem embarrassed for sure. They didn't raise their hands while we were on a meet, so that's all I can do since classes happen online. Teacher

Distance learning is more personalized and student-centered, in addition to the use of a comprehensive and creative platform with instruments capable of measuring various abilities and competencies. The student has greater freedom and space to manage his own time in a distance learning model, as the routine is not entirely focused on his academics. Productivity, concentration, and motivation will all benefit. Furthermore, implementing the education 4.0 paradigm, in which student learning is individualized and supported by a wide set of collaboration tools, will need the adoption of a remote learning model based on an innovative technological platform with diverse learning aspects (Almeida & Simoes, 2019; Hussin, 2018).

Difficulties with slow internet connection. Most of the participant's difficulties in a synchronous class are the loss of internet connection.

The internet connection is not consistent regarding its speed, especially since I live on an island, so while having a class, the teacher's voice is unclear due to unstable connection, which is why I cannot understand the lessons. GP3

The result from the teacher interview also coincides with the student's responses regarding the loss of internet connection.

One of the most significant difficulties is the internet connection because once it falters in the middle of the class, students understanding stops, and there will be no continuity once they enter the class again. I already discussed the other example. So, there will be no continuity of the discussion. Teacher

Most of the participants are having a problem with their internet connection, especially those students who live in remote areas. That is the reason why they do not really understand the discussion of the teacher because once the connection falters in the middle of the discussion, students understanding stops, and there will be no continuity because once they enter the class again, the teacher has already moved to another part of the topic.

In a related study, Kapasia et al. (2020) studied how lockdown affects pupils' learning performance. The lockdown caused considerable disruptions in pupils' learning, according to their findings. Students also mentioned certain difficulties they had when taking online programs. Anxiety, sadness, poor Internet connectivity, and an unsuitable home learning environment are all factors that are exacerbated for marginalized and remote students.

Dealing difficulties in learning Mathematics in the Modern World

The research participants mentioned how they deal with the difficulties they encounter in learning Mathematics in the Modern World during synchronous classes, and two themes emerged: asking for assistance from classmates, friends, and YouTube or Google, and the second is acceptance of the reality.

Asking assistance from classmates, YouTube or Google. Most of the participant's responses are the same. They seek help from classmates, YouTube, or Google to cope with the difficulties they encounter during synchronous classes. They need them as their partners in learning Mathematics in the Modern World.

The first thing we do if we don't understand the topic or cannot answer the worksheet is looking for videos on YouTube, and if the video tutorial still confuses us, we search for answers on google. And if we still can't find answers, that's the time that we will seek help from our classmates or ask for an answer. GP1

Even teachers mentioned that her students tried to seek help from the different platforms and friends to help them cope with their difficulties on the subject.

They tended to ask questions during group chats, especially when I was not there. As in my case, I do not have group chats. I stop having one because it bothers me. So, there they can address their questions that they don't want their

teacher to know that question. Another coping mechanism is they watch YouTube videos related to my topic. The online materials depend on their diligence to go on and on. Teacher

It demonstrates that classmates are a valuable resource for participants in overcoming obstacles to grasping the content and completing their worksheets. Both directly and indirectly, classmates can assist a student in learning (Connor et al., 2012). By providing information or evaluations, classmates can directly assist a student. A classmate can, for example, clarify the definition of a vocabulary word (Murphey, 1994). When a student submits an idea, a classmate can either accept its validity and further justify it or detect its weaknesses and correct them. As a result, classmates can help a student learn by providing knowledge, validating accurate ideas, or identifying errors. Through incentives and norms, classmates can also indirectly assist a student in learning. They can encourage students to love studying, which encourages them to put up effort and persevere in the face of obstacles (Chiu & McBride-Chang, 2006).

Acceptance to the reality. Most of the participants also prove that acceptance is the key to adapt this new situation because this is the new normal.

I think the first way to deal with this situation is through acceptance and finding something to compromise with because we cannot do anything about this situation. So, we have to take it, and we should adjust. (GP4)

The teacher also mentioned that to adapt to this situation, acceptance and adjustment are needed since the pandemic cannot be avoided.

To deal with this difficulty is to accept this challenge since we cannot do anything about it, and we need to practice it because this situation won't last anyway. As we observe our situation, it is slowly returning to normal but let's not forget that we have gone through this crisis. Teacher

The unexpected stress of adjusting to the new "normal" has thrown the entire educational system into disarray. Teachers' techniques of communicating with their pupils are rapidly changing, putting strain on both official and informal instructors. To accommodate health constraints, many teachers are increasingly working in online classrooms, using video conferences and other tools. Many educators, understandably, want to return to a sense of normalcy before the pandemic. Some community leaders, however, see the outbreak as a chance to strengthen systems, particularly education (Lang, 2021).

Conclusion

Research participants described their learning experiences in Mathematics in the Modern World during Synchronous classes. Schools had to switch from face-to-face to synchronous classes during the COVID-19 pandemic. Students were studying online via google meet to the extent that they could not really understand the lesson well. With open-ended questions about the teacher's delivery of the lessons, the research participants mentioned that lessons are related to a real-life situation, and also there are some complications in delivering the lesson, which urged them to have some strategies to learn like watching videos on YouTube and reading the provided materials in the Google Classroom.

The difficulties they have encountered in learning Mathematics in the Modern World during synchronous classes are difficulties learning Mathematics in the Modern World, difficulties in answering the worksheets, and difficulties with slow internet connection. The research participants also lack intrinsic motivation. The difficulties of online learners serve as a basis for teachers to find ways to address these negative notions. Teachers have to be creative in delivering the content of the course (O'Doherty et al., 2018). For instance, PowerPoint slides with a voice recording or a previous video recording of the lesson may be utilized for lecture sessions. These materials may be accessed anytime, and students with a slow internet connection can still follow the phase of the course. Teachers may conduct synchronous learning sessions to answer questions or clarifications. An unwavering teacher's dedication and understanding are suggested to assist online learners in finishing the course.

Despite these existing barriers, the research participants could still adapt and continue to be more equipped with knowledge and skills by always seeking help from their classmates, YouTube, or Google and through acceptance. Thus, the researcher concludes that teachers are truly needed to monitor by communicating with the learners. With the triangulation of data, the researcher recommends that learners must also be familiarized with enough knowledge and skills to be more equipped when learning Mathematics in the Modern World during synchronous classes.

References

Almeida, F., & Simoes, J. (2019). The role of serious games, gamification and industry 4.0 tools in the education 4.0 paradigm. *Contemporary Educational Technology*, 10(2). <https://doi.org/10.30935/cet.554469>

- Ariyanti R., (2020) The effects of online mathematics learning in the covid-19 pandemic period: A Case study of Senior High School Students at Madiun City, Indonesia- *Mathematics Teaching Research Journal* fall, 2020 Vol 12, no 3 <https://commons.hostos.cuny.edu/mtrj/>
- Azizah, S. N., & Suhendra. (2020). Mathematics anxiety of senior high school students based on extrovert and introvert personality types. *Journal of Physics Conference Series*, 1521(3).
- Baticulon, R. E., Sy, J. J., Alberto, N. R. I., Baron, M. B. C., Mabulay, R. E. C., Rizada, L. G. T., Tiu, C. J. S., Clarion, C. A., & Reyes, J. C. B. (2021). Barriers to online learning in the time of COVID-19: A national survey of medical students in the Philippines. *Medical Science Educator*, 31, 615–626
- Baticulon, R. E., Sy, J. J., Alberto, N. R. I., Baron, M. B. C., Mabulay, R. E. C., Rizada, L. G. T., Tiu, C. J. S., Clarion, C. A., & Reyes, J. C. B. (2021). Barriers to online learning in the time of COVID-19: A national survey of medical students in the Philippines. *Medical Science Educator*, 31, 615–626.
- Benson, P. (2001). Teaching and researching autonomy in language learning
- Beverland, M. & Lockshin, L. (2003). A longitudinal study of customers' desired value change in business-to-business firms, *Industrial Marketing Management*, 35, 383-393
- Bringula, R. P., Batalla, M. Y. C., & Borebor, M. T. F. (2021). Modeling computing students' perceived academic performance in an online learning environment [Paper presentation]. ACM-SIGITE'21, SnowBird, UT, USA. <https://doi.org/10.1145/3450329.3476856>.
- Chiu M. M., McBride-Chang C. (2006). Gender, context, and reading: A comparison of students in 43 countries. *Scientific Studies of Reading*, 10, 331–362
- Mixed Methods Research, London, Sage, pp. 22-36.
- Chiu M. M., McBride-Chang C. (2006). Gender, context, and reading: A comparison of students in 43 countries. *Scientific Studies of Reading*, 10, 331–362
- Clarke, D., Roche, A., Cheeseman, J., & Sullivan, P. (2014). Encouraging Students to Persist When Working on Challenging Tasks: Some Insights from Teachers. *Australian Mathematics Teacher*, 70(1), 3
- Cantanero, M., Valmorida, F.M., Bachoco, M., Tura, L., Oregue, C., Andales, G.V., & Alayon, M. (2022). Exploring perspectives of senior citizens on Covid 19 vaccination. *International Journal of Academic Multidisciplinary Research*, 6(8), 14-20. <https://tinyurl.com/ymvrj96v>
- Famor, L.J.M., Arandi, S.F.A., Capangpangan, S.D., Naparan, G.B., & Alayon, M.F. (2022). Parents' Motivational Strategies in Modular Learning. *International Journal of Social Sciences & Educational Studies*, 9(3), 228-246. Doi: 10.23918/ijsses.v9i3p228
- Flack, C. B., Walker, L., Bickerstaff, A., Earle, H., and Margetts, C. (2020). Educator perspectives on the impact of COVID-19 on teaching and learning in Australia and New Zealand. *Pivot Professional Learning*.
- Hammersley, M. (2008), *Troubles with Triangulation*, in (Ed) M. Bergman, *Advances in Mixed Methods Research*, London, Sage, pp. 22-36.
- Hammersley, M. & Atkinson, P. (1983), *Ethnography: Principle* Mixed Methods Research, London, Sage, pp. 22-36.
- Hammersley, M. (2008), *Troubles with Triangulation*, in (Ed) M. Bergman, *Advances in Mixed Method Research*, London,
- Hamouda, A. (2013). An Investigation of Listening Comprehension Problems Encountered by Saudi Students in the EL Listening Classroom. *International Journal of Academic Research in Progressive Education and Development*, 2(2), 113-15.
- Husman, J., & Lens, W. (1999). The role of the future in student motivation. *Educational Psychologist*, 34(2), 113-125.
- Hussin, A. A. (2018). Education 4.0 made simple: Ideas for teaching. *International Journal of Education & Literacy Studies*, 6(3), 92-98. <https://doi.org/10.7575/aiac.ijels.v.6n.3p.92>
- Kapasias, N., Paul, P., Roy, A., Saha, J., Zaveri, A., Mallick, R., & Chouhan, P. (2020). Impact of lockdown on learning status of undergraduate and postgraduate students during COVID-19 pandemic in West Bengal, India. *Children and Youth Services Review*, 116, 105194.
- Kirkwood, A., & Price, L. (2014). Technology-enhanced learning and teaching in higher education: What is 'enhanced' and how do we know? A critical literature review. *Learning, Media and Technology*, 39(1), 6–36. doi:10.1080/17439884.2013.770404
- Kusmaryono, I., Gufron, A. M., & Rusdiantoro, A. (2020). Effectiveness of scaffolding strategies in learning against decrease in mathematics anxiety level. *NUMERICAL: Jurnal Matematika Dan Pendidikan Matematika*, 4(1), 13–22.
- Lindstrom, R. (1994). *The Business Week Guide to Multimedia Presentations: Create Dynamic Presentations That Inspire*. New York: McGraw-Hill.
- Moellwald, F. E. (1997). Perspectives of elementary school teachers concerning the link between mathematics taught in school and everyday mathematical practices. Unpublished doctoral dissertation, Indiana University.
- O'Connor, E. E., Dearing, E., & Collins, B. A. (2011). Teacher–child relationship and behavior problem trajectory-
- Ocampo, J. F. G. (2017). Analysis of the use of Google Classroom, in the students of System Engineering of the Instituto Tecnológico de Mexicali. *European Journal of Multidisciplinary Studies*, 6(2), 60-62.
- Orlando, J., & Attard, C. (2015). Digital natives come of age: The reality of today's early career teachers using mobile devices to teach mathematics. *Mathematics Education Research Journal*, 28, 107–121. doi:10.1007/s13394-015-0159-6
- Perez Cereijo, M. V. (2001). Factors influencing how students value asynchronous Web-based courses. Unpublished doctoral dissertation, University of North Texas. *Dissertation Abstract International*, AAT 9989796.
-

- Pintrich, P. R. & Garcia, T. (1991). Student goal orientation and self-regulated learning in the college classroom. In M. L. Maehr & P. R. Pintrich (Eds.), *Advances in motivation and achievement: Goals and self-regulatory processes* (Vol. 7, pp. 371- 402). Greenwich, CT:JAI press.
- Pratama, H., Nor, M., Azman, A., Kassymova, G. K., & Shakizat, S. (2020). The trend in using online meeting applications for learning during the period of pandemic covid-19: a literature review. *Journal of Innovation in Educational and Cultural Research*, 1(2), 58–68. <https://doi.org/10.46843/jiecr.v1i2.15> in elementary school. *American Educational Research Journal*, 48(1), 120–162. Doi:10.3102/0002831210365008
- Ramirez, M., Naparan, J., & Naparan, G. (2022). Guiding children through self-learning modules (SLM): Exploring parents' experiences. *The Normal Lights* 16(1). DOI:[10.56278/tnl.v16i1.1986](https://doi.org/10.56278/tnl.v16i1.1986)
- Roscoe, R. D. (2014). Self-monitoring and knowledge- building in learning by teaching. *Instructional Science: An International Journal of the Learning Sciences*, 42(3), 327-351.
- Russo, J., & Hopkins, S. (2017). Student reflections on learning with challenging tasks: 'I think the worksheets were just for practice, and the challenges were for maths'. *Mathematics Education Research Journal*, 29(3), 283-311. <https://doi.org/10.1007/s13394-017-0197-3>
Sage, pp.22-36
- Salac, R. A., & Kim, Y. S. (2016). A study on the internet connectivity in the Philippines. *Asia Pacific Journal of Business Review*, 1(1), 67–88.
- Shields, S. B. (1997). A profile of commonalities and characteristics of contextual teaching as practiced in selected educational settings. Ed.D. Dissertation, Oregon State University, Oregon. Retrieved June 12, 2004, from Dissertations & Theses: Full Text database. (Publication No. AAT 9824765)
- Sullivan, P., Bobis, J., Downton, A., Feng, M., Hughes, S., Livy, S., McCormick, M., & Russo, J. (2020). Threats and opportunities in remote learning of mathematics: implication for the return to the classroom. *Mathematics Education Research Journal*, 32(3), 551-559. <https://doi.org/10.1007/s13394-020-00339-6>
- UNESCO [63957], International Association for the Evaluation of Educational Achievement [62]
<https://unesdoc.unesco.org/ark:/48223/pf0000380398>
- Kirkwood, A., & Price, L. (2014). Technology-enhanced learning and teaching in higher education: What is 'enhanced' and how do we know? A critical literature review. *Learning, Media and Technology*, 39(1), 6–36. doi:10.1080/17439884.2013.770404
- Hammersley, M. (2008), *Troubles with Triangulation*, in (Ed) M. Bergman, *Advances in Mixed Methods Research*, London, Sage, pp. 22-36.
- Hammersley, M. & Atkinson, P. (1983), *Ethnography: Principle Mixed Methods Research*, Lond
Mixed Methods Research, London, Sage, pp. 22-3
- Mixed Methods Research, London, Sage, pp. 22-36
- Baticulon, R. E., Sy, J. J., Alberto, N. R. I., Baron, M. B. C., Mabulay, R. E. C., Rizada, L. G. T., Tiu, C. J. S., Clarion, C. A., & Reyes, J. C. B. (2021). Barriers to online learning in the time of COVID-19: A national survey of medical students in the Philippines. *Medical Science Educator*, 31, 615–626.
- Benson, P. (2001).