PEDAGOGY
for Online Learning

Theory and Practice

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editors

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Preface

During this unprecedented time, almost all educational institutions have shifted from traditional learning to online learning. When the COVID-19 hit the world, online teaching was no longer an option but a necessity. Due to government restrictions and other related protocols, schools, colleges, and universities opted to deliver academic instructions into online to ensure that students still receive quality learning they deserve. Online learning is a tool in which teaching and learning process still become student-centered, innovative and flexible. However, online learning can also become a disadvantage as there are many challenges associated with online teaching and learning. This e-book offers the different perspectives on online learning: framework, learning experiences both on students and teachers and its associated future management.

The introductory part of this book gives an overview and framework of online learning. It provides technical discussions of learning management systems and teaching and learning modalities used in online learning. It serves as guide in the development of the appropriate learning management system and modality relevant to the capacity and necessity of the academic institutions. The authors shared their actual experiences in the development and management of the systems and programs in online learning.

Part 2 of the book contains the efficacy of online learning experience as per the students' perspective. It highlights the attitude of students towards distance learning at the peak of

the pandemic termed as 'behavioral Coronaphobia.' This part also highlights the expectations of high school and higher education students on online learning and teacher-created videos as a tool in the online learning. The authors shared the results of their studies on the actual experience of their students which unveiled the various positive and negative facets of online learning.

In part 3, the efficacy of online learning as per teachers' perspective is presented. This part highlights the experience of the rural science teachers and the school administrator during the new normal in education. Recommendations outlined on this part serve as bases for further analysis in terms of online teaching-learning implementation. Meanwhile, the future of online learning is outlined in part 4, which can be a basis for further review. The model contained in the paper can be particularly applied in higher education where online platform may be adapted for long in the post-pandemic new normal.

This e-book offers major research results on the conduct and implementation of online teaching and learning in the context of COVID-19 pandemic. It provides a unique perspective on the research issues regarding the effects of online learning from many experts in this field.

Let us learn from the various personal experiences and perspectives of the researchers from various fields of specialization!

About the editors

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Learning Mathematics in the New Normal through Teacher-Created Videos

Jahfet N. Nabayra

Introduction

In the past years, majority of the learning process of the students was through classroom setting or face to face interaction. Teachers used to deliver their lessons through face to face lectures, interactive activities, live discussions, hands - on practicum, and the like. However, the pandemic posed an excellent opportunity to change the way we teach mathematics in schools. Because of the pandemic, education had to migrate to the online environment. The Commission on Higher Education (CHED) advised institutions of higher education in the Philippines to implement distance education methods of learning for its classes, such as the use of educational technology, to maximize the academic term despite the suspensions (Hallare, 2020). Online learning is education that takes place over the internet. Online learning is just one type of distance learning for any learning that takes place across distance and not in a traditional classroom (Ariyanti & Santoso, 2021).

Furthermore, based on the study of Tyaningsih et al. (2020), after the surveys and online interviews through Google forms and Google meetings on what the students thought about online learning, some of the advantages of online learning were practical (easy to use), flexible (can be done anywhere and anytime), and can be done casually (while lying down, eating, drinking, etc.). Though e-Learning has been slowly being a part of the medium of instruction in the Philippine education, challenges have been evident on the use of it especially in Mathematics courses (Cortez, 2020). The study of Ariyanti and Santoso (2021) in Indonesia on online mathematics learning prior and after the pandemic found out that the average student's positive response towards mathematics before online learning is greater than after online learning. Obstacles faced by students when participating in online

learning include the issue on the teacher who directly gives questions without any material explaining how to solve problems making the students unaware on how to understand the material. In the Philippines, the study of Guansi et al. (2020) among college students found out that students still prefer the learning process where the teacher explains the lessons followed by an assessment. This indicates that students can make their learning process through learning resources. However with the explanation of the teacher via online, it is still important for them that teachers discuss their lesson for them to understand deeply the subject matter.

Considering these gaps in pedagogy and learning resources in higher education in the Philippines and other countries on how to make learning in the new normal effective, inclusive, flexible, and efficient, many studies suggested the use of instructional videos in mathematics education and other fields. Ariyanti and Santoso (2021) found out that the students prefer online mathematics learning where teachers should make videos or explain material through videos so that students can better understand completion steps and formulas that can be used. Tanujaya et al. (2021) also concurred the use of video in an effort to increase interaction between teachers and students in learning. Teachers need to make more innovative approaches to achieve the learning objectives of mathematics instruction. Wang (2021) on his study in an online undergraduate math course revealed that students improve much more in test performance when using fewer technologies and tools like videos and forums. An appropriate number of pre-lecture and lecture videos are in need to assist students with academic improvement.

As a response to the demand of the new normal learning to tailor instructional materials suited for online learning, the researcher has been using teacher-created videos uploaded in YouTube to make mathematics learning flexible, inclusive, and efficient despite the pandemic. Hence, this study was initiated to describe the experiences of the students in learning mathematics in the new normal through the use teacher-created videos.

Theoretical Framework

This study was anchored on E-learning theory of Mayer, et al. (2015) which consists of cognitive science principles that describe how electronic educational technology can be used and designed to promote effective learning. These include the following empirically established principles: Multimedia principle (also called the Multimedia Effect), Modality principle, Coherence principle, Contiguity principle, Segmenting principle, Signaling principle, Learner control principle, Personalization principle, Pre-training principle, Redundancy principle, and Expertise effect. Furthermore, teachers could apply this e-learning theory in their classrooms to create effective technology-enabled instructional materials.

Methodology

This study employed a descriptive research design. According to Kumar (2011), a study in which the main focus is on description, rather than examining relationships or associations, is classified as a descriptive study. A descriptive study attempts systematically to describe a situation, problem, phenomenon, service or program, or provides information about, say, the living conditions of a community, or describes attitudes towards an issue. Since the purpose of the study involves describing the experiences of the students in learning mathematics in the new normal through teacher-created videos, a descriptive study is well-fitted.

Moreover, the participants of the study were twenty randomly selected first year non-mathematics major college students from a State University in Western Visayas. These students are taking Mathematics in the Modern World (MMW), a general education subject in the Higher Education curriculum, during the conduct of the study. Students' pseudonyms were used in the discussion of the qualitative data to ensure anonymity and confidentiality of identities. The open-ended questionnaire used in the study through google form was validated by experts. A total of eight (8) teacher-created videos ranging from 30-40 minutes per topic/video were uploaded in YouTube as an instructional material in teaching

mathematics. The unified parts of the videos were the following: title, learning objectives, overview, discussion with integrated self-assessment, and references. In addition, thematic analysis was used to analyze the data gathered in the study.

Findings and Discussion

When these non-mathematics major students were asked about their experiences on the use of videos in learning mathematics online, their responses present the idea that the videos were easy to understand, flexible, with implied social presence of the teacher, and suited to new normal learning. The students were allowed to answer in their mother tongue or native language so that they can express their thoughts better. English translations were provided in the discussion for those answers of the students based on their native languages.

Easy to Understand. The answers of the students boil down to the idea that the videos utilized in class are easy to understand learning material. Since the videos were personally made by the teacher, a detailed, guided, and informative discussion was presented in the videos to meet the objectives of a particular lesson. The clarity of the discussion was also considered by the students as a significant part why the videos were easy to understand.

Student A stated that, *"Videos gave us a better view and understanding about our lesson on math, it became our guide in easy learning the topic and finding some sort of ideas in solving the activity. And it made me/us more knowledgeable about the concept of this subject. Video became our guide and way to correct our output/ activity."*

It was also validated by Student B and Student C who cited *that "My experience about watching videos helped me to easily understand the lesson. It's really a big help for me to analyze the problem because when the teacher is explaining through video, it gives me a clear explanation and knowledge on how the problem will be solved."*

Student C: *"As I've watched the videos, my experience about it was memorable because the videos gave me a sense of excitement in answering the activities you've given. It helps me easily understand the ways on how to solve the problem."*

Furthermore, the students found the videos in the material simple, comprehensive, effective, and easy to understand as agreed by Student D and Student E.

Student D further added, *"Easy and interesting sir, kasi ano sir… mahambae ko nga easy kasi kung tutuusin abi sir hay mas madali akong makaeubot kato sa video kaysa sa ginadiscuss it teacher sir…" (It was easy and interesting because actually, I can comprehend easily the video compared to the actual discussion of the teacher…).*

Student E said that, *"Video is very beneficial and effective educational material for me because it is comprehensible, understandable, and composed of various examples. It is good for those students who cannot easily understand and catch up a certain topic fully like me because it gives me a chance to study it again. The efforts of putting some pictures, voice over, and the smooth transitions of effects are also helpful in learning the discussion very well."*

These teacher created videos indeed embody the multimedia and modality principles of Mayer et al. (2015). Using any two out of the combination of audio, visuals, and text promote deeper learning than using just one or all three. Learning is more effective when visuals are accompanied by audio narration versus onscreen text.

Flexible. Moreover, the flexibility of the videos played a big part in its effectiveness as a learning material because students can play and pause the videos depending on their available and most convenient time. It was further validated by what Student G, Student H, Student I, and Student J have said.

Student G: *"I am grateful that there's a video explainer in each modules. It helps me to understand the lessons well. With the advantage that we can re-watch the explainer to fully get the totality of mathematical ideas."*

Student H: *"...Moreover, the videos aren't just a way to help us learn but also to boost our independence in learning. In my own stand, I have learned so much thing by just simply watching the videos provided. Other than it is reliable, it also allowed each of us to learn from your discussion in our most comfortable time. The video also lessen my problem with regards of my internet connection because after I downloaded it, I can watch it until I deeply understand without spending a lot of data connection."*

Student I: *"...With the help of these videos, hindi po mahirap ang umintindi sa mga lessons, masaya nga po kasi pwede naming ma pause yung may mga questions at answeran upang ma check kung nauunawaan namin yung diniscuss." (With the help of the videos, understanding the lessons seems to be easier because we can pause and answer the questions posted in some part of the videos, then play it again to check our understanding of the topic discussed).*

Student J: *"Learning with videos help me understand more the lesson. It is very flexible even compared to face to face class because whenever my brain is not ready for the information, I am free to rewind and play it again."*

This result agrees with what Kahrmann (2016) have found out that other factors that students' thought enabled the videos to be effective included the videos being available on their phones so they could watch them anywhere and anytime. They liked them being available if they were absent from class, so they would not get behind in their work. It also affirms the Learner control principle of Mayer, et al. (2015) which states that for most learners, being able to control the rate at which they learn helps them learn more effectively.

Social Presence of the Teacher. Many of the participants also shared the same idea that the videos used during their online mathematics class highlighted the social presence of the teacher. Some even argued that their experience is comparable to the usual face to face classroom set-up because they are still listening to the voice of the teacher while discussing the lesson. The combination of visual and audio elements of the video through the teacher's discussion played a vital role in making this experience

meaningful for the students. This is depicted in the answers of Student L, Student M, and Student N.

Student L: *"Medyo malayo ang agwat ng face-to-face class sa online at modular learning. Itong videos po na ito ay magandang way for the students to learn and understand the lessons well. It's just like a normal set-up of class kung saan mayroong teacher na nag di-discuss." (There is a huge gap between face-to-face instruction and online learning. These videos are good strategies for the students to learn and understand the lessons well. It is similar to the normal face-to-face instruction wherein a teacher discusses the topic.)*

Student M: *"Some courses and subjects, like Math and Science, truly need face-to-face interactions and hands-on performances that an online or modular means cannot carry out. However, when the videos were introduced to me, somehow I felt the typical classroom vibe. I can clearly hear the voices of my instructors and vividly grasp the whole idea of the topic being discussed. The mathematical stuff is bearable to understand and feasible for us to manage our time learning."*

Student N: *"Honestly speaking, videos have been great platforms that were provided in this class. Through these, it was easy for me to understand clearly the topic. My experience in watching videos felt like I'm on a face to face to class, because there's a discussion clearly stated in the video same as in modules. Hence I can tell that this was a big help in learning and catching up a lesson. That's why I am grateful enough that there are videos provided in this class."*

It is, indeed, important that the teacher's presence must manifest in an instructional video tutorial as corroborated by the study of Kahrmann (2016) that the teacher's voice has been found to be an effective design feature of the tutorials for both the students and the parents. All positive comments centered on how the tutorials sounded like the teacher was talking directly to the student in conversational style. Hence, teacher-created videos make learning personalized as reflected in the personalization principle of Mayer et al. (2015).

Suited to New Normal Learning. Ultimately, the students also agreed that the videos used in online mathematics learning are suited in the new normal way of learning because of the clear and detailed explanations, flexibility, accessibility, and built-in reflective assessment for independent learning. They also expressed the idea that this might be a good solution to the problem on how to maximize learning despite of the current pressing situation.

Student H narrated that *"During this pandemic, we aren't be able to attend school and be guided personally, but the educational videos you've created has become an effective solution for us who are struggling with the new normal education. Moreover, the videos aren't just a way to help us learn but also to boost our independence in learning. In my own stand, I have learn so much thing by just simply watching the videos provided. Other than it is reliable, it also allowed each of us to learn from your discussion in our most comfortable time."*

Student O also shared the same point, *"learning through watching videos helps me to further understand the lesson. It gives me a clear explanation how to solve problems. It expand the knowledge that the teacher is trying to discuss. For me it is necessary to have videos with this new way learning."*

Student P also cited that *"Base on my experience in learning with the videos, it helped me to understand the lesson and it was easy to learn or gain knowledge. Even if there's a crisis that we are facing today which affected our studies, there's a solution like what we are doing today, online learning and by watching videos."*

This confirms the study of Ariyanti & Santoso (2021) in Indonesia on online mathematics learning which found out a suggestion from students for online mathematics learning, that, teachers should make videos or explain material through videos so that students can better understand completion steps and formulas that can be used. Even before the pandemic, the students, based on their learning experiences with the video-based e-modules, found it to be unique and interesting, has immediate feedback with rich

examples, flexible and efficient, effective and easy to understand in learning the concepts of mathematics (Nabayra, 2020).

Conclusion

Videos are truly beneficial in learning mathematics in the new normal considering the flexible modalities like online and remote learning. To add, teacher-created videos exemplify effective, efficient, flexible, personalized, and appropriate learning resources in making mathematics instruction meaningful, easy to understand, and engaging despite the challenges brought by the pandemic.

Thus, institutions of higher learning like the universities and colleges have to prioritize trainings, workshops, and other professional engagements involving the teachers on the development of technology-enabled learning resources that would answer the demands of time. This would help the teachers to become more creative and adept in instructional materials development that could bolster their morale on becoming excellent instructional designers in the 21st century and the next normal.

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