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Readiness in Mathematics Flipped Classroom of Filipino Secondary School Teachers

Mary Jo-ann A. Juarez[1], Nora V. Marasigan[1], Shaira Anne P. Natanauan[1] & Gemmalyn M. Trinidad[1]

[1] College of Teacher Education, Batangas State University JPLPC-Malvar, Batangas, Philippines

Correspondence: Nora V. Marasigan, College of Teacher Education, Batangas State University JPLPC-Malvar, Batangas Province, 4232, Philippines.

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Abstract

School's access to technology is increasing steadily every day and most of these technologies are now even used in classroom. Due to these circumstances, educators' ideas of using technology to support deeper learning in multiple ways gave rise to the concepts of distance and blended learning. Hence, this study determined the readiness in Mathematics flipped classroom of selected Filipino secondary school teachers at the Division Schools of Tanauan City during the School Year 2016-2017. Specifically, it dealt with the following: profile of the respondents in terms of sex, age, highest educational attainment, and number of seminars attended related to ICT; respondents' assessment on their readiness in Mathematics flipped classroom; and relationship between the respondents' profile and their readiness in Mathematics flipped classroom.

By employing the descriptive type of research with the researcher-made questionnaire, the study found out that the respondents were ready in Mathematics flipped classroom. Moreover, the results of the study revealed that there was a significant relationship between the respondents' profile and their readiness in Mathematics flipped classroom. With these, the researchers proposed a course of action to support the readiness of Mathematics teachers in a flipped classroom.

Keywords: mathematics flipped classroom, flexible environment, learning culture, intentional content, professional educator

1. Introduction

Learning is the acquisition of knowledge and information in various ways. Most people perceived learning as interactions that take place inside the school while some see it as realizations gained through prior experiences. In today's fast-changing world, technology has big contribution to education and learning. Many technological advances offer new knowledge and resources in schools worldwide; thus, enriching curricula and altering the types of teaching available in the classroom. Schools' access to technology is increasing steadily every day and most of these technologies are now used in classroom. Due to these circumstances, educators used technology in ways that can benefit not just the teacher but also the learners. Educators' ideas of using technology to support deeper learning in multiple ways gave rise to the concepts of distance and blended learning.

Distance learning, sometimes called e-learning, is a formalized teaching and learning system specifically designed to be carried out remotely by using electronic communication. Horn & Staker (2012) define blended learning as a formal education program with face-to-face instruction, in which a student learns at least in part through online delivery of content and instruction. Indeed, distance and blended learning have distinct features with similarities on online usage and differences on the manner of delivery.

Studies suggested the use of another learning approach which is the flipped learning. Similar to the concepts of distance and blended learning, this approach makes use of technology as a teaching tool. Some notable educators have been comparing the three learning approaches in terms of their screen cast or video components, but there are still clear differences. Distance learning occurs remotely, and teachers do not engage in face-to-face interactions. Virtual class meetings, assignments, and lectures happen online through a course management website. Meanwhile, blended classes also have an online element, but that usually occurs during class time along with direct student-teacher contact.

Students' experiences in face-to-face sessions vary; however, they are not necessarily different from what occurs in a traditional classroom. In the flipped classroom, the use of videos or other digital technologies to deliver content

outside of class does not guarantee that anything different will occur during class time. Yet, due to the emphasis on students becoming the agents of their own learning rather than the object of instruction, the flipped learning model can enable educators to make the shift from teacher-driven instruction to student-centered learning.

The flipped classroom approach is embedded in socio-constructivist concepts of education and active learning, and embraces and values informative media used for content delivery. The flipped classroom method has developed from key educators and scholars who have founded their flipped classes on concepts and ideas of active learning, blended education, differentiated instruction, and communal inclusion, pursuing to synthesize these concepts in the flipped classroom approach (Hamdan et al., 2013).

Bergmann and Sams (2012) have taught flipped high school science classes since 2009, and also are considered the originators of the modern flipped class model. They have recently published a book, which has been considered a strong instruction resource by the Flipped Learning Network. They also found that a strong point of the flipped classroom model is through its flexibility, which permits educators to tailor their core curriculum and to employ more time speaking to their learners and differentiating instruction. Currently, the flipped classroom method continues to advance as educators implement and adapt this approach to their instructional needs.

Furthermore, Overmyer (2012) described flipped classroom as a teaching approach that reverses the role of the schoolroom instruction and out-of-school homework. Learners are provided instructional resources before class which commonly includes a video discourse which the teacher prepared in advance.

A flipped class combines two well-known elements of education: the lecture and active learning. Learners have access to video lectures beforehand along with other related material, which frees up additional face-to-face time to let students search for clarification from educators, work together with peers, and practice relating concepts while getting supervision and feedback right from experts. Educators who flip their class value lectures given as homework, as support to learning. Homework is essential because it is a time where learners can share their learning improvement with their family, be only with their thoughts, reflect on their education, and assess the material as well as the educator's feedback (Fulton, 2012).

Nowadays, most teachers tend to focus on a normal traditional lecture wherein time is allotted on discussing the lesson to students then proceeding to giving activities. Teachers usually make this as a routine causing the students to fail in appreciating the subject matter itself. Through engaging students on flipped classroom, the teacher will catch the attention of students in a way that the students will also be motivated to learn.

With the K-12 curriculum which promotes technical and vocational growth among students and the flipped classroom approach which uses technology as tool, the approach can be incorporated to enhance and deliver a more positive change in teaching and education. The Philippines is now facing the age of globalization where technology breakthroughs are advancing. It is in this context that this research was conceived. In order to respond to the multiple challenges of the 21st century, the researchers believe that flipped classroom may be a possible answer. Flipped classroom is no different for many since foreign educators were also practicing this approach to teaching because of its effectiveness.

Since this learning approach involves a person's engagement in learning, it is but proper to analyze and determine the readiness in Mathematics flipped classroom of selected Mathematics secondary school teachers at Division Schools of Tanauan City. The researchers believe that it is best to conduct the study among Mathematics teachers as their field of specialization requires ample time for the students to gain mastery. It will also provide new insights and knowledge that they may use to blend with the demands of the 21st century.

1.1 Objectives of the Study

This study determined the readiness in Mathematics flipped classroom of selected Mathematics secondary school teachers. These teachers came from different national high schools in the Division Schools of Tanauan City.

Specifically, this study sought answers to the following questions: What is the profile of the respondents in terms of sex, age, highest educational attainment; and number of seminars attended related to ICT?; How may the readiness in Mathematics flipped classroom of the respondents be described in terms of flexible environment, learning culture, intentional content; and professional educator?; Is there a significant relationship between the respondents' profile and their readiness in Mathematics flipped classroom?; and lastly, what course of action may be proposed to support the readiness of Mathematics teachers in a flipped classroom?

2. Method

The researchers used the descriptive correlational method of research to answer the questions posed in this endeavour. They also correlated the respondents' profile and their readiness in Mathematics flipped classroom.

The researcher-made questionnaire was given to 41 selected secondary Mathematics school teachers at the Division Schools of Tanauan City, S.Y. 2016-2017. They were chosen as respondents since they are currently teaching Mathematics subject in their respective schools.

The study made use of a 4-point scale in which the respondents were asked to express the degree to which they agree or disagree with each of the statements by checking their appropriate choice. These are presented in terms of weighted means with their corresponding descriptive equivalents. Scale Mean Ranges Interpretation 4 3 2 1 3.51 – 4.00 2.51 – 3.50 1.51 – 2.50 1.00 – 1.50 Strongly Agree/Highly Ready Agree/Ready Disagree/Not Ready Strongly Disagree/Highly Not Ready. The quantitative data gathered were subjected for checking, scoring, analysis and interpretation with the help of the statistician. The researchers with the help of the statistician made a careful evaluation of the results of the questionnaires. Each item in the questionnaire was analysed and interpreted in order to arrive at definite results of the study.

3. Results

This chapter covers the presentation, analysis and interpretation of the quantitative data gathered in the investigation. To give an in-depth analysis and interpretation, the data are arranged thematically and sequentially resembling the presentation of specific problems posed at the beginning of the study.

3.1 Profile of the Respondents

The succeeding tables present the profile of the respondents in the Division Schools of Tanauan City. This was grouped according to sex, age, highest educational attainment and number of seminars attended related to ICT.

Table 1. Profile of the Respondents

Sex	Frequency	Percentage
Male	13	32.00
Female	28	68.00
Total	**41**	**100.00**

Age in Years	Frequency	Percentage
50 – 59	6	15.00
40 – 49	16	39.00
30 – 39	9	22.00
20 – 29	10	24.00
Total	**41**	**100.00**

Highest Educational Attainment	Frequency	Percentage
Master's Degree	6	15.00
Bachelor's Degree with MA Units	24	59.00
Bachelor's Degree	11	26.00
Total	**41**	**100.00**

Number of Seminars Attended Related to ICT	Frequency	Percentage
5 and above	9	22.00
3 – 4	17	41.00
1 – 2	15	37.00
Total	**41**	**100.00**

Most of the respondents were female and belonged to the age bracket 40-49. In terms of highest educational attainment, most of them attained bachelor's degree with MA units and attended three to four seminars related to ICT.

According to Felipe (2013), it is the goal of the Department of Education to help every teacher to become not only efficient but also effective. Trainings and seminars on ICT, workshops on new methods and techniques in teaching, orientations on the K-12 Curriculum, Values Formation Seminars and the likes are being held in different parts of the country so as to prepare all the teachers in globalization.

3.2 Respondents Readiness in Mathematics Flipped Classroom

The succeeding tables present the data of the respondents' readiness in Mathematics flipped classroom in terms of flexible environment, learning culture, intentional content and professional educator.

Table 2. Flexible Environment

Item Statements	Mean	Verbal Interpretation
As a Mathematics teacher, I can …		
1. establish spaces and time frames that permit students to interact and reflect on their learning as needed.	3.44	Agree
2. observe and monitor students continually to make appropriate adjustments on their learning.	3.56	Strongly Agree
3. rearrange learning spaces physically to accommodate a lesson or unit, supporting either group work or independent study.	3.46	Agree
4. prepare appropriate assessment systems that objectively measure understanding in a way that is meaningful for students.	3.59	Strongly Agree
5. assure that there is maximum availability of technological facilities and equipment for access of students.	3.02	Agree
Overall	**3.41**	**Ready**

The respondents were ready in Mathematics flipped classroom in terms of flexible environment obtaining a composite mean of 3.41. This proves that teachers nowadays tend to observe and monitor students, rearrange learning spaces and prepare appropriate assessment systems.

Table 3. Learning Culture

Item Statements	Mean	Verbal Interpretation
As a Mathematics teacher, I can …		
1. scaffold the activities and make them accessible to all students through differentiation and feedback.	3.27	Agree
2. explore topics in greater depth using videos and create rich learning opportunities for students where they can share their technological abilities.	3.15	Agree
3. make students actively involved in knowledge construction with the help of available technology as they participate in and evaluate their learning.	3.39	Agree
4. utilize learner-centered approach inside the classroom with the integration of technology-based activities.	3.49	Agree
5. shift to delivering more learning content outside of class and using class time to review, apply, and reinforce learning take work, planning, and practice.	3.46	Agree
Overall	**3.35**	**Ready**

The readiness level in Mathematics flipped classroom in terms of learning culture among the respondents was evidently ready which obtained a composite mean of 3.35. The flipped classroom acknowledges that everyone learns at different paces. This serves as a reason for utilizing a learn-at-your-own-pace style of education. It relies heavily on the principle that students are self-motivated (Krueger, 2014).

Table 4. Intentional Content

Item Statements	Mean	Verbal Interpretation
As a Mathematics teacher, I can …		
1. prioritize concepts used in direct instruction for learners to access on their own.	3.44	Agree

2. create relevant content (typically videos) and differentiate to make content of a lesson accessible and relevant to all students.	3.05	Agree
3. help students develop conceptual understanding as well as procedural fluency about the subject matter.	3.63	Strongly Agree
4. maximize classroom time in order to adopt student-centered methods and active learning strategies depending on the subject matter.	3.51	Strongly Agree
5. transfer more learning outside the classroom wherein the content moves from supporting role to a central role.	3.12	Agree
Overall	**3.35**	**Ready**

The readiness level in Mathematics flipped classroom in terms of intentional content among the respondents was ready obtaining a composite mean of 3.35. Thus, it can be inferred that the respondents are more than ready in Mathematics flipped classroom in terms of flexible environment.

Table 5. Professional Educator

Item Statements	Mean	Verbal Interpretation
As a Mathematics teacher, I can …		
1. make myself available to all students for individual, small group, and class feedback in real time as needed such as using skype, facebook video chat, and other video conferencing applications.	3.20	Agree
2. conduct ongoing formative assessments during class time through observation and by recording data to inform future instruction.	3.41	Agree
3. collaborate and reflect with other educators using social media and take responsibility for transforming my practice in teaching.	3.27	Agree
4. accept productive and constructive criticisms from others to enhance my potentialities and capabilities in relation to my professional growth.	3.54	Strongly Agree
5. observe students, provide relevant feedback and assess their classroom work constantly.	3.54	Strongly Agree
Overall	**3.39**	**Ready**

To sum it up, Mathematics teachers were ready in a flipped classroom in terms of professional educator. As revealed, it obtained a composite mean of 3.39.

3.3 Relationship between the Respondents' Profile and their Readiness in Mathematics Flipped Classroom

The table shows the relationship between the respondents' profile and their readiness in Mathematics flipped classroom. The correlation of the variables was tested using the Chi-square formula.

Table 6. Relationship between the Respondents' Profile and their Readiness in Mathematics Flipped Classroom

Variables	Computed $\chi 2$	p Value	Decision (H_o)	Interpretation
Sex and Readiness in Mathematics Flipped Classroom	15.361	0.002	Reject	Significant
Age and Readiness in Mathematics Flipped Classroom	28.802	0.001	Reject	Significant
Highest Educational Attainment and Readiness in Mathematics Flipped Classroom	22.046	0.001	Reject	Significant
Number of Related Seminars and Readiness in Mathematics Flipped Classroom	19.807	0.003	Reject	Significant

The table shows that when the profile of the respondents in terms of sex was correlated to their readiness in Mathematics flipped classroom, the computed Chi-square value is 15.361. Acquiring the equivalent p-value of 0.002, the null hypothesis was rejected. This means that there is a significant relationship between the profile of the respondents in terms of sex and their readiness in Mathematics flipped classroom.

The second variable correlated with readiness in Mathematics flipped classroom was the respondents' age. The computed Chi-square value was 28.802 with its equivalent p-value of 0.001. Since p-value is less than 0.05, the null hypothesis was rejected. This means that there is a significant relationship between the respondents' profile in terms of age and their readiness in Mathematics flipped classroom.

The third variable correlated with readiness in Mathematics flipped classroom was the respondents' highest educational attainment. Obtaining a computed Chi-square value of 22.046 and p-value of 0.001 which is less than 0.05, the null hypothesis was rejected. This means that there is a significant relationship between the respondents' profile in terms of highest educational attainment and their readiness in Mathematics flipped classroom.

The fourth variable correlated with readiness in Mathematics flipped classroom was the respondents' number of seminars attended related to ICT. Acquiring a computed Chi-square value of 19.807 and p-value of 0.003 which is less than 0.05, the null hypothesis was rejected. This means that there is a significant relationship between the respondents' profile in terms of number of seminars attended related in ICT and their readiness in Mathematics flipped classroom.

3.4 Course of Action to Support the Readiness of Mathematics Teachers in a Flipped Classroom

Table 7. Course of Action to Support the Readiness of Mathematics Teachers in a Flipped Classroom

Objectives	Strategies	Persons Involved	Target Date	Expected Output
1. To orient and practice teachers on technology integration in instruction, allow oneself in experimenting with technology tools	Learning management system may be used to distribute materials, track students' progress and allow students to ask questions.	School Officials and Faculty	SY 2017 – 2018	Teachers and other school officials will be more knowledgeable, aware and prepared on technology integration in teaching using flipped classroom approach to meet the challenging demands of the 21st century.
2. To enhance collaborative instruction among Mathematics teachers through co-teaching and team teaching, buddy up with one or more teaching partners	Teaching partners may help in recording lessons and may serve as a sounding board for ideas.	Principal and Faculty	SY 2017 – 2018	Faculty members who are well-equipped with knowledge on mathematics flipped classroom.
3. To expose teachers to innovation in technology such as videos and podcasts	Flip a few lessons and build up until you've flipped one entire class. Then use lessons learned to flip other classes.	School Officials Faculty	SY 2017 – 2018	Teachers will be skilled and well-equipped in using technology as instructional material and will be more creative, resourceful and innovative.
4.To organize small student groups that serve as ongoing work groups for in-class activities.	The idea facilitates learning and gives students a preview of real world work, where group problem solving and project-based learning are routine.	Faculty and Students	SY 2017 – 2018	Students who are independent learners and problem solvers.

4. Discussion

According to Bantugan (2009), teachers are potent factors in education. They are responsible for shaping the youth through quality education. With this context, it is imperative for teachers to acquire the totality of information and qualities of education through instructions and training which maximize the development of an individual physically, mentally, and morally. Teaching strategies acquired from seminars and workshops can be effective in changing the lives of students.

Hill (2012) added that in order to become a truly great teacher, one must go beyond the textbook and attend workshops and ongoing education courses to truly master the practice. There are conferences, workshops, and continuing education that could give the teacher extra help in technology for their students. There are also workshops on how to integrate technology into the classroom and how to make it cross curricular. These conferences and workshops will give the teacher the information and tools needed to integrate technology in the classroom.

The above contexts proved that attending related seminars may affect the readiness of teachers in a mathematics flipped classroom since they develop knowledge and understanding on technological concepts and they acquire skills that are necessary to reinforce the teaching approach.

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