



Modern Mathematics Applications: Solutions to Challenges Encountered in Teaching Spiral Progression in Mathematics 7

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Abstract

The purpose of this research is to investigate the modern math applications that can address the challenges encountered by 21 seasoned teachers in teaching Spiral Progression in Mathematics 7. Basic qualitative research was used in this study. The interview was done during the one-week seminar training in the application of different math applications to the classroom setting. The teacher participants mentioned that they found difficulty in making power-point presentations in basic constructions in Geometry. They said that set and union set are their difficulties since they find complications in looking for figures, and illustrations that needed to present in the class. They added that it's hard for them to use modern technologies on sets because of the excessive board work. As to Patterns and Algebra, all 21 teacher participants mentioned that the topics that hard to be applied with modern technologies were irrational numbers, solving problems in linear equations, operation on polynomials and inequalities, and fundamental operations on algebraic expressions. In addition, the teachers mentioned that they find difficulty integrating technologies on topics in Algebra especially word problems. The master teacher participants advised the seasoned teachers to use platforms such as Desmos and Khan Academy to address their challenges. These are web-based graphing calculators that include basic construction in Geometry. In Patterns and Algebra, the master teachers instructed the seasoned teachers to venture on using my script calculator, lecture notes, and photomath. According to them, these math apps can aid the teachers and students in solving linear equations, inequations, etc.

Subject Areas

Information Science, Sociology

Keywords

Challenges Encountered, Geometry, Modern Mathematics Applications, Mathematics 7, Patterns in Algebra, Spiral Progression

1. Introduction

In the restructured curriculum of the Department of Education in the Philippines, mathematics disciplines are taught in a spiral progression, which implies that the same concepts are developed from one grade level to the next, rising in complexity and sophistication. From Grades 7 through 10, the teachers teach the five mathematics curriculum areas of Numbers and Number Sense, Measurement, Geometry, Patterns and Algebra, and Probability and Statistics in increasing complexity (Dep. Ed., 2014) [1].

However, most mathematics teachers struggled with this spiral progression since they are used to handling only one mathematical subject for the entire year. In this situation, they must master five courses and teach them for an entire academic year. Furthermore, the government encourages math educators to modernize their teaching methods and include new technology into their lessons. This has increased the challenges the teachers [2] are facing as pedagogical figures. Moreover, while seasoned teachers are well-versed in the subject, they require assistance in increasing their technology abilities through workshops, trainings, and seminars in teaching and mathematical problem solving [3] [4]. Lack of trainings of teachers [5] means lesser improvement of students' performance in Mathematics [6] as cited in [7]. "With more technology exposure for students and more professional development for teachers to hone their newly acquired teaching methods, 1:1. Technology may be the catalyst needed for school districts to help their students achieve at higher levels" [8].

In the article regarding the problems encountered in K to 12 curricula in Nueva Ecija, Bala (2017) [9] "claimed that the need of teachers to be trained on pedagogy, educational research, measurement and evaluation and classroom management is very vital". "Bala added that lack of technological competence is a serious concern that must be addressed immediately considering that many professionals were really attracted to the teaching positions offered by the DepEd because of high salary" [9].

The researchers being educators in the new curriculum have experienced many of the problems mentioned above. Thus, they were motivated to conduct this study focused on Geometry and Patterns and Algebra to help identify existing challenges experienced by mathematics teachers under the new curriculum and solutions their master teachers proposed with regards to the integration of

modern technology in their classroom [10]. The above premises justify the timeliness and relevance of this research.

2. Methodology

This study is anchored on educational technology (Ed Tech). Ed Tech is defined as “the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources” [11]. Basic qualitative research was used in this study. “The descriptive qualitative design is the most prevalent type of qualitative study, and its major purpose is to give meaning to a person’s experience. Interviews, observations, and documents are used to create narrative transcripts, which are then examined to come up with solutions to the research problems” [12], as cited in [13]. In this study basic qualitative research using narrative analysis was used to describe the challenges encountered by the 21 seasoned teachers in the Department of Education in Nueva Ecija and the solutions offered by Five (5) master teacher experts in addressing the issues. Interview was done during the one-week seminar-training in the application of different math applications to classroom setting.

3. Results and Discussion

During the one-week seminar-training in the application of different math software to classroom setting, interviews, observations, and documents were utilized by the researchers to obtain the results of this study which were narratively presented in this section.

3.1. Challenges Encountered by Seasoned Teachers and Solutions Offered by Master Teachers in Teaching Spiral Progression in Geometry

Ten teacher participants mentioned that they found difficulty in making power-point presentations in basic constructions in Geometry. Eleven said that set and union set are their difficulty since they find difficulties in looking for figures, hard and illustrations that needed to present in the class. They added that it's hard for them to use modern technologies on sets because of the excessive board work.

The findings clearly show that the Grade 7 Mathematics teachers are not familiar with other math applications other than power-point presentation.

The master teachers advised the seasoned teachers to use platforms such as Desmos and Khan Academy to address their difficulties. These are web-based graphing calculators that include basic construction in Geometry.

According to Boaler (2018) [14], Desmos, a web-based graphing calculator (Figure 1), is a good platform for teachers to use in Geometry. The Desmos classroom activities page is an excellent place to start when it comes to getting students to experiment with and test mathematical ideas, as well as share and collaborate.

On the other side, Khan Academy is one of the more classic math apps (Figure 2). It allows students to review and re-learn math (as well as other topics) in a classroom-like setting. The program features over 10,000 videos, 40,000 questions, and a wide range of math topics, including fundamental geometry building.

3.2. Challenges Encountered by Seasoned Teachers and Solutions Offered by Master Teachers in Teaching Spiral Progression in Patterns and Algebra

All 21 teacher participants mentioned that the topics that hard to be applied with modern technologies were irrational numbers, solving problems in linear equations, operation on polynomials and inequalities and fundamental operations on algebraic expressions. In addition, the teachers mentioned that they find difficulty integrating technologies on topics in Algebra especially word problems.

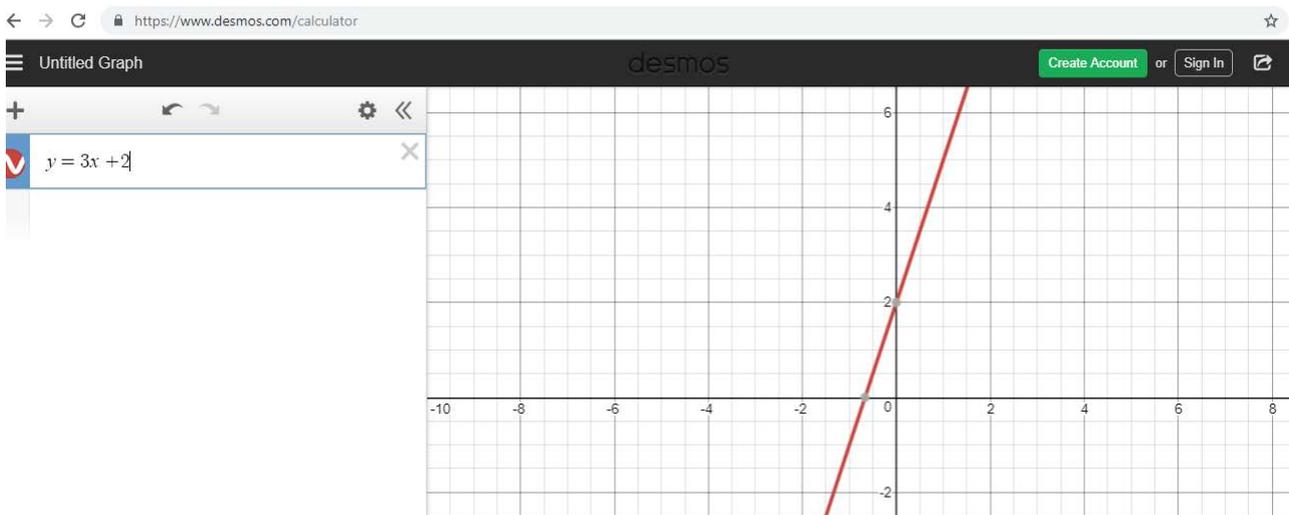


Figure 1. Desmos calculator.

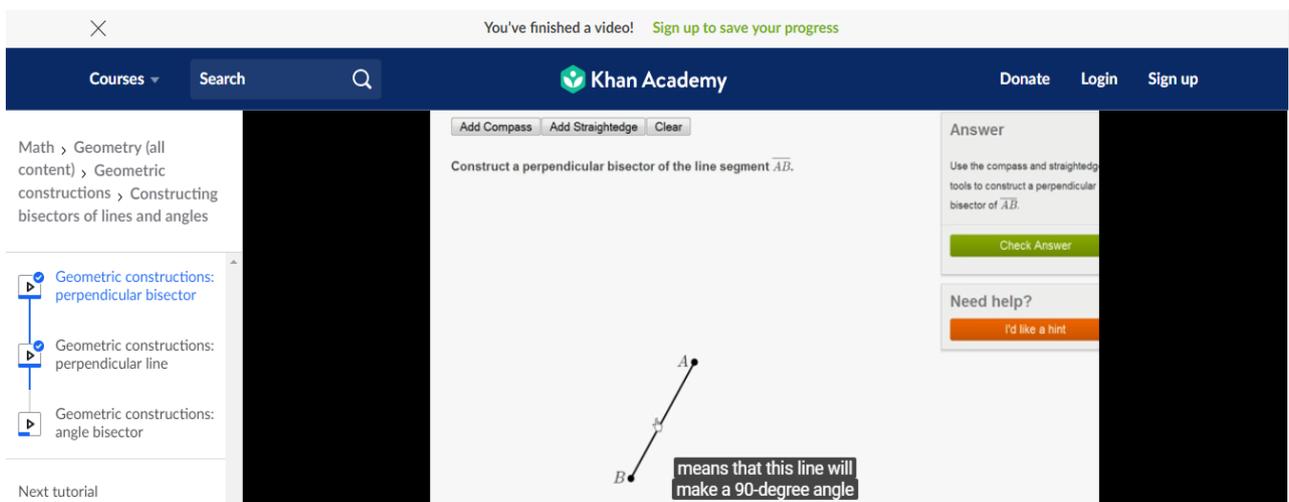


Figure 2. Khan academy.

The master teachers instructed the seasoned teachers to venture on using myscript calculator, lecture notes and photomath. According to them, these math apps can aid the teachers and students in solving linear equations, in-equations, etc. These apps will greatly help the teachers and the students will enjoy using and learning them [15].

MyScript Calculator (Figure 3), according to Hindy (2018) [16], is one of the few math apps that can assist kids in solving equations, equalities, and inequalities. Individuals can use the app to write equations. After that, the program transforms it to text and fixes the problem. All of the basic operators, as well as trigonometry, inverse trigonometry, logarithms, and constants, are supported. Middle school, high school, and early college students are most likely to benefit from this.

For these issues noted by the seasoned teachers, the LectureNotes and PhotoMath programs are ideal (Figure 4). One of the most popular note-taking apps for smartphones is LectureNotes. It has been designed with education in mind. A student can use the app to take notes, draw and write by hand, and even record his or her teacher's lecture to listen to later. Similarly, photomath is one of the few good math apps that also has a camera. A student can basically take a

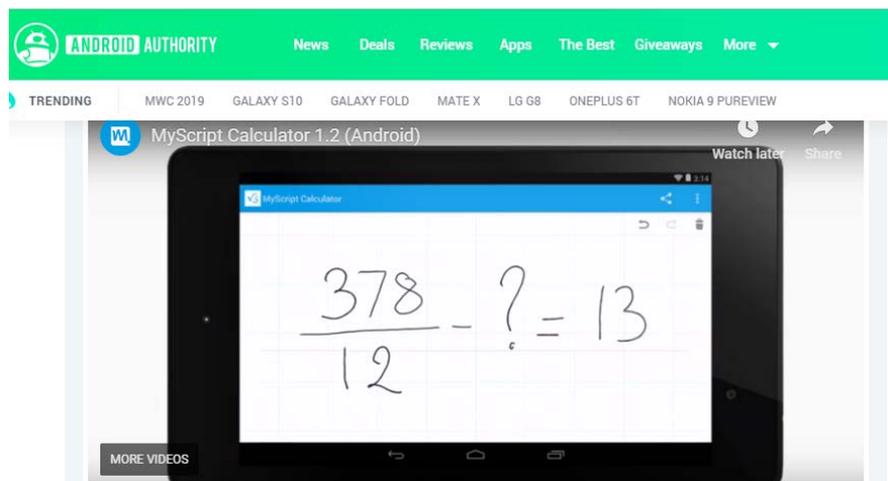


Figure 3. MyScript calculator.

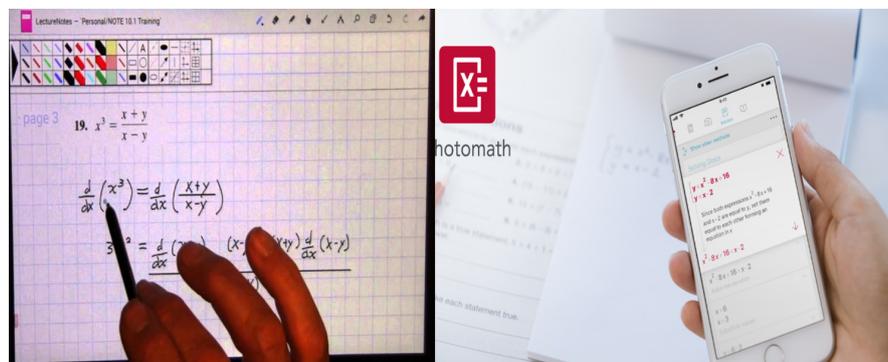


Figure 4. Lecture notes & PhotoMath.

picture of the difficulty on his or her paper with his or her camera phone. It gives students step-by-step instructions on how to answer the problem, as well as the many arithmetic skills they'll need to do so. There are no in-app purchases in this app [17].

4. Conclusion

Apart from the specific topics, inadequate Wi-Fi or no internet connections were also mentioned by almost all of the participants. Because they are unable to implement the new trend in classroom scenarios, the majority of them are not exploring newer technology applications. In conjunction with these national recommendations, the scientific literature shows that technology can increase students' knowledge of mathematics and their achievement [17]. Students have been able to envision mathematics, engage in active learning procedures, verify conjectures, have good attitudes, and gain confidence in their abilities to do mathematics thanks to the use of technology. Despite these findings, additional studies [18] [19] [20] imply that technology is not commonly employed in K-12 mathematics classrooms. National recommendations, research on the use of technology in mathematics education, and the actuality of technology use in many mathematics classrooms all point to a disconnect. A detailed examination of mathematics teachers' methods reveals that several obstacles must be overcome in order to encourage effective technology integration in mathematics instruction, including a shortage of materials and internet access, as found in this recent study and the research of Kersaint (n.d.) [21].

Conflicts of Interest

The authors declare no conflicts of interest.

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