

INTEGRATING POSTER AND ORAL PRESENTATION IN THE TEACHING AND LEARNING OF GENERAL MATHEMATICS: A QUANTITATIVE STUDY

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ABSTRACT

Poster and oral presentation can serve as alternative learning assessment tools in the teaching of General Mathematics as these elicit group effort among learners to come up with a consensus. In this research, the use of poster and oral presentation in General Mathematics was integrated in the teaching and learning process to determine the influence of these assessment tools in the knowledge and understanding of senior high school students in topics on Interest and Stocks and Bonds. Pre- and post-tests were administered, and results were subjected to t-test to find out significant difference on their performance on said tests. Perceptions and attitudes of students towards the integration of these tools in the teaching – learning process are also assessed. At the beginning, students showed little knowledge on Interest and Stocks and Bonds but when asked to make a poster and do oral presentations in class, a highly significant increase in their knowledge and understanding of the topics was observed. Students showed positive feedback on the use of poster and oral presentation in mathematics class expressing and emphasizing that these are easy to carry out, served as opportunities for them to collaborate, brainstorm and cooperate with their classmates, paved way to learn math better and can be used for future math lessons.

Keywords: Poster, Oral Presentation, Perceptions, Attitudes, General Mathematics.

INTRODUCTION

In the Philippines, Republic Act 10533 (Enhanced Basic Education System) popularly known as K-12, was signed into law on May 15, 2013. It is aimed at addressing the deficiency in the Philippine basic educational system (Official Gazette, 2013) and is envisioned at producing empowered individuals (K-12 Curriculum Guide - Mathematics, 2012). It is believed to be the commencement of the fundamental overhaul of (Okabe, 2013) and the most comprehensive reform ever done to the country's educational system (SEAMEO INNOTECH, 2012). In the K-12 curriculum, K-10 mathematics is considered as a skills subject focused on critical thinking and problem-solving, offers a strong foundation for Mathematics 11 – 12 and provides essential

concepts and skills needed by Filipino learners as they transcend stages in life as learners and citizens of the country (K-12 Curriculum Guide - Mathematics, 2012). In the senior high school, a two-year specialized upper secondary education, Mathematics is one of the seven learning areas under the core curriculum and is focused on General Mathematics and Statistics and Probability.

In the country, the value and importance of math go beyond the four corners of the classroom (K-12 Curriculum Guide - Mathematics, 2012) as it helps students utilize, recognize and generalize patterns that exist in numbers, shapes and other mathematical symbols (Reyes, et al., 2018). With its importance, the teaching of mathematics needs to be effective. This means that effective teaching should incorporate effective techniques that can ensure effective learning. Lectures can still be used as a major teaching method but needs to be blended with other methods and approaches and even tools (Grobelaar, 1998; Iqbal, 2004; Perveen, 2010). Assessment tools may also be varied to give opportunities for every student to demonstrate learning in various ways (Black & Wiliam, 1998; Popham, 2008; Jacobs, 2010; Price, et al., 2011).

In a study conducted about the incorporation of the use of poster and oral presentation as alternative learning assessment tools in the teaching of secondary mathematics, students' performance in mathematics significantly improved by carrying out the projects or tasks assigned to them. These tasks enabled the students to involve themselves in class and make them accountable for their own learning. These tools get away students from the usual scenario of copying other students' answers to certain tasks or assignments. Poster and oral presentations served as channel of collaboration and cooperation among learners (Nor, 2014).

Poster, as a teaching tool, is a thoughtfully constructed and well-designed visual that helps carry message clearly to the intended audience and may be used to inform students or support teaching in class (Murdoch, 2014). On the other hand, oral presentation is generally defined as a short talk on a specific topic which is given to a tutorial or seminar group in which presenter gives a talk and presents views on topics based on readings or researches (The Learning Centre, 2010). Oral presentation provides opportunity for learners to use second language to naturally communicate with others and gives pleasurable learning experiences among students and allows students to involve in a cooperative task in which they work with their classmates and explain ideas and convey meaning in a larger context (Brooks & Wilson, 2015). Oral presentations are found to have benefited students as these are opportunities for them to practice language skills, teach something to their peers, work independently and effectively and provide higher level of motivation. Presentations have shown improvement on students' abilities that can benefit them in their future employment (Živković, 2014).

With this, the researchers integrated the use of poster and oral presentations in the teaching and learning of General Mathematics aiming for the improvement of knowledge and understanding of Grade 11 students in specified topics. Students were grouped to elicit effort, cooperation and collaboration among members. Posters were made to show a clear visualization of students on the topic assigned to them and oral presentations were done to test their communication and critical skills. These two endeavors are believed to serve as learning opportunities for students to further develop their creativity, analytical and critical skills, and communication skills.

Research Objectives

This study was primarily conducted to evaluate the effect of the integration of poster and oral presentation in the teaching and learning of General Mathematics to students' knowledge and understanding of specific topics in the subject in one of the general high schools in the province of Quirino, Philippines. These tasks engage students in learner-centered activities that enable them to think critically and creatively and work cooperatively and effectively. Specifically, it worked on the following research objectives:

1. to determine the effects of the integration of poster and oral presentations on students' knowledge and understanding of Interest and Stocks and Bonds, lessons in General Mathematics; and
2. to find out the perceptions and attitudes of students towards the use of poster and oral presentation as alternative assessment tools in the teaching and learning of General Mathematics.

LITERATURE REVIEW

Mathematics is an important discipline which nurtures one's power of reasoning, creativity, concrete and non-concrete thinking, critical thinking, problem-solving ability and even effective communication skills. Everyone needs math even a farmer or a carpenter, an engineer or a doctor, a musician or a magician. It provides the opportunity for both simple and complex various real-world contexts through different strategies. Math helps predict behavior of nature and phenomena in the world. It is also a tool to control occurrences of the world to prevent mankind from being devastated (Reyes, et.al., 2018). In the country, math is one of the subjects that pervaded life in any age in all circumstances. Thus, its value and importance go beyond the four corners of the classroom, so it should be learned comprehensively with much depth (K – 12 Curriculum Guide – Mathematics, 2012).

With the value of mathematics, it necessary that the subject is taught effectively. Teachers should give students opportunities, motivation and support to engage in critical thinking, reasoning and making sense of mathematics since continuous engagement of students to these kinds of tasks lead to deeper understanding of math and increased ability to solve problems, reason out efficiently and communicate effectively (Butty, 2001). In the Philippine basic education, mathematics is centered on developing students' critical thinking and problem-solving grounded and framed on experiential and situated learning, reflective learning, constructivism, cooperative learning, discovery and inquiry-based learning (K-12 Curriculum Guide - Mathematics, 2012).

There are various teaching strategies and assessment tools that can be used to effectively teach and learn mathematics. Through experiential learning advocated by David Kolb, learning occurs through making sense of direct everyday experiences. On the other hand, cooperative learning puts premium on active learning and is achieved through group effort and engagement. Through discovery and inquiry-based learning promoted by Bruner, students own personal experiences are used to discover facts, relationships and concepts (K-12 Curriculum Guide - Mathematics, 2012).

Further, assessment tools for mathematics class may also vary depending on purpose. Varying assessments give opportunities for students to demonstrate their knowledge in various ways. This may be done through paper assessments, class projects, examinations, among others. Changes and alterations in assessment procedures are believed to ensure holistic approach to learning. Teachers in the past have always evaluated student knowledge through recall test but teachers of today are trying to shift assessment methods and tools to support learning and improve teaching practice (Black & Wiliam, 1998; Popham, 2008; Jacobs, 2010; Price, et al., 2011).

Posters and oral presentations in the teaching and learning of mathematics may also be used. Posters are visuals that help one to relay important message for the intended audience (Murdoch, 2014) and were found to be effective tool for students to express learning (Zevenbergen, 1999). Oral presentations are opportunities for students to use second language to communicate naturally with other learners (Brooks & Wilson, 2015) and provide higher level of motivation among them (Živković, 2014).

METHODOLOGY

The study was conducted in a general high school in the province of Quirino, Cagayan Valley, Philippines with 27 Grade 11 students as participant-respondents in the first trial and 24 and 30 students in two classes in the second trial. Students are of varied sex, on the average have proficient performance in mathematics having general average ranging from 85 – 89 and belong in the Science and Technology, Engineering and Mathematics (STEM) strand. Before the study was conducted, researchers sought permission from school authorities and discussed the objectives of the study. Participant-respondents were also oriented regarding their participation and involvement in the research process. Interest, a topic in General Mathematics, was used as a springboard in the making of poster and holding of oral presentations in class in the first trial and Stocks and Bonds in the second trial. The topics were discussed in class by the mathematics teacher teaching the subject. Pre- and post-tests, which are identical, are administered before the discussion of lesson and after the assessment, respectively. Items included in the tests are based on the concepts discussed about interest and stocks and bonds.

The pre-test and post-test used included 15 items. The test is adapted from a teacher-made test prepared by a teacher who also teaches General Mathematics. Discussion of the lesson took the teacher 20 minutes. Discussion included important concepts on Interest and Stocks and Bonds. Students were strategically grouped to enable them to work effectively and efficiently. After which, material in the form of handout was given to each group. Then, students were asked to review and study the material so they can have a better understanding of the lessons presented. Students are required to make a poster visualizing their knowledge and understanding of the topics. Poster making encourages group effort, cooperation and collaboration. Each group is given the rest of the time to finish the task. After posters were created, group representatives discussed their understanding of the concept through oral presentation. Rubrics were used so that outputs are graded accordingly. After the oral presentation, a post-test was administered to test if there were improvement in their scores. Improvement in test scores means improvement on the knowledge and understanding of students on the topics discussed in class.

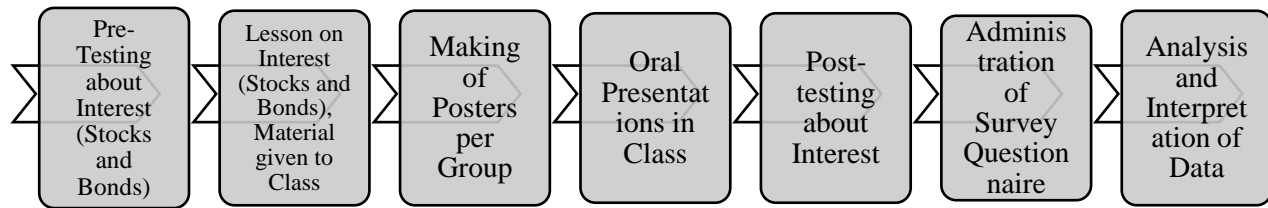


Figure 1. Framework showing the administration of the research study

Test scores, both in the pre-test and post-test, were subjected to statistical analysis which become a basis for interpretation of results. Paired t-test was used as quantitative data analysis tool for pre- and post-test scores of students. This tool is used to check if there is significant increase or improvement in the knowledge and understanding of students on the topics. A survey questionnaire was administered to determine the perceptions and attitudes of students on the use of poster and oral presentation in a mathematics class. Unstructured interviews were also done to verify the responses of students on the survey. The survey questionnaire was adopted (Nor, 2014) and consisted of 16 items. The first part included items on the general beliefs of students on poster and oral presentation, second part consisted items on perceptions about own ability to do oral presentation and make poster and third part included items on general acceptance towards poster and oral presentation. A four-point Likert scale was used, ranging from strongly disagree to strongly agree, eliminating middle scales to avoid the “culture of playing safe” among respondents. Descriptive statistics such as mean was used to describe perceptions and attitudes.

RESULTS

Effects Of The Integration Of Poster And Oral Presentation On Students’ Understanding And Knowledge Of Interest And Stocks And Bonds, Lessons In General Mathematics

Table 1. T-test on the Pre- and Post-Tests of Students on General Mathematics

First Trial, Class A				
Variables	Mean	t-test Result	p-value	Result
Pre-Test	7.89	-7.605	.000	Highly Significant
Post-Test	12.21			
Second Trial, Class B				
Variables	Mean	t-test Result	p-value	Result
Pre-Test	4.13	-19.696	.000	Highly Significant
Post-Test	13.72			
Second Trial, Class C				
Variables	Mean	t-test Result	p-value	Result
Pre-Test	3.48	-7.118	.000	Highly Significant
Post-Test	13.15			

p-values ≤ 0.05 are significant and ≤ 0.01 are highly significant

During the first trial, students’ mean scores in the pre- and post-tests are 7.89 and 12.21, respectively. Generally, the mean scores indicate improvement on the understanding and knowledge of students on Interest, a topic in General Mathematics. Further, the p-value is 0.000 which means that result is highly significant. On the second trial, the mean scores of Class B

students in the pre- and post-tests are 4.13 and 13.72, respectively while Class C students have 3.48 and 13.15, respectively. P-values for the two classes, B and C, are both 0.000 which are interpreted as highly significant. Results indicate that there are significant differences on the mean scores of students in the pre- and post-tests in the two trials and in all classes. Thus, results show that there is a highly significant increase in the knowledge and understanding of students on the indicated topics. Moreover, the use of poster and oral presentation in class can further be intensified and be adopted for future lessons.

This result is similar to a study where students' knowledge and understanding in trigonometry have significantly increased through poster and oral presentation, from 29.80 to 67.05 mean scores in the pre- and post-tests, respectively (Nor, 2014.) Further, posters are regarded as effective tool for assessment and learning within mathematics education as these provide alternative form for students to express learning (Zevenbergen, 1999). On the other hand, oral presentations are found to be beneficial for students to practice language skills, teach something to their peers, work independently and effectively and improve students' abilities (Živković, 2014).



Figure 2. Sample Posters of Students on Interest

The figure shown are sample posters of students presented in class. One group emphasized the difference between large and small interests by using a weighing scale with a man carrying the small interest and another man struggling while settling large interest. The man carrying small interest is free and worryless about debt. Interest of debt was pursued because the man was able to pay debt. On the other hand, the other man is struggling of his debt and interest. The man seems like crawling on his feet because of depression brought about by debt. In the poster presented, tombstones were drawn to show that there was destruction of property, imprisonment and many other events happened to demonstrate the consequences of debt and large interest. The group highlighted that when people are planning to borrow money in a bank or other crediting agencies,

one should think wise. It is good that one should think to borrow to an agency that offers the least interest. Another group drew a road in the middle with a rich man that is riding in a vehicle. As the road goes, wealth also increases from coins to jewelries. This means that a man gets successful as he journeys. The poster conveys an important message that anybody can be successful and can reach dreams. There may be obstacles along the way but with confidence and hard work and avoiding debts, one can still succeed.

The other group used different colors and shapes, so they can express meaningfully the message they wanted to relay. This poster shows their knowledge on simple interest. The group divided the material into two: one side having a dull background and the other with a colorful background. This poster shows the choices people may take in investing money. It also demonstrates the consequences of choosing one that entails a high and low interest. In summary, by simply having a good decision, one can arrive at a good outcome. In investing, one should consider one that entails a lower interest. The different posters portray the understanding of students on the concept of interest. Further, they also showed the application of these concepts in decisions people make about investing money. They emphasized that people should be critical in decision-making, taking into account the lowest interest a loan or debt can entail.

Perceptions And Attitudes Of Students Towards The Use Of Poster And Oral Presentations As Alternative Assessment Tools In The Teaching And Learning Of General Mathematics

Table 2. General Beliefs of Students on the Integration of Poster and Oral Presentation in the Teaching and Learning of General Mathematics

General Beliefs about Poster and Oral Presentation	Mean	Qualitative Description
1. Doing Mathematics poster and oral presentations helps me learn mathematics.	3.47	Strongly Agree
2. Doing Mathematics poster and oral presentations helps me to be more aware of my understanding of Mathematics.	3.52	Strongly Agree
3. Oral presentations skill is important in Mathematics learning.	3.47	Strongly Agree
4. I am able to express about my feeling through Mathematics poster and oral presentations.	3.27	Strongly Agree
5. I am able to tell others about my understanding of Mathematics through Mathematics poster and oral presentations.	3.07	Agree
6. Doing Mathematics poster and oral presentations make me think broader and deeper about Mathematics.	3.37	Strongly Agree
7. Looking and listening to other classmate poster and oral presentations are helpful for me in learning Mathematics.	3.37	Strongly Agree
8. Doing Mathematics poster and oral presentations makes me learn Mathematics better.	3.61	Strongly Agree
9. Doing Mathematics poster and oral presentations are a waste of time.	1.72	Strongly Disagree

Legend: 3.26 – 4.00 Strongly Agree 2.51 – 3.25 Agree
1.76 – 2.50 Disagree 1.00 – 1.75 Strongly Disagree

In most cases, students strongly agree to the statements on general beliefs on the integration of poster and oral presentations in the teaching and learning of General Mathematics which indicate that students have positive reaction on the use of the indicated assessment tools in Mathematics class. Further, they strongly agreed that these assessment tools help them learn the subject more

and be aware of their understanding of Math. These tools enabled them to express themselves and make them think broader and deeper. Poster and oral presentations are opportunities for students to collaborate and brainstorm with each other so that they can come up with an output of consensus. Students also strongly agreed that seeing and listening to their classmates during the creation of poster and carrying out oral presentations are helpful in their learning of math. Students strongly agreed that one's oral presentation skill is important in a mathematics class. Poster and oral presentations are ways to tell others about their understanding of math. These assessment tools help them learn math better. Further, posters and oral presentations are believed to be ways for students to tell others about their understanding of math. On the other hand, they strongly disagreed that using or integrating these tools in the teaching and learning of Mathematics is just a waste of time. This means that students believed of the importance of integrating poster and oral presentations in mathematics class because these help them learn the subject better, give opportunities for collaboration and cooperation and ways to express themselves.

Results are similar to the study conducted by Nor (2014) where students positively responded to the items regarding beliefs on the usefulness of poster and oral presentations. Students believed that these tools help them learn math better and disagreed that doing poster and oral presentations are a waste of time. Further, on another study, 83% of students agreed that they learned from the posters of their classmates which means that posters are effective tools to learn specific topics better (Koshy, 2011). Posters are believed to foster student learning, provide opportunity to pair visual learning with other traditional tasks and improve metacognitive practice (Clark & Paivio, 1991; Manarin, 2016; Logan, et al., 2015). Also, students claimed that discussions within the class are opportunities for students to practice and share their experiences with their classmates which then cultivates both their critical and communication skills (Kennedy, 2007).

Table 3. Perceptions of Students on their Own Ability to Make Poster and Do Oral Presentation in a Mathematics Class

Perceptions on Own Ability to Make Poster and Do Oral Presentation	Mean	Qualitative Description
1. Doing Mathematics poster and oral presentations are easy to me.	2.73	Agree
2. I am not afraid of doing Mathematics poster and oral presentations.	2.63	Agree
3. I know how to get started when I am doing Mathematics poster and oral presentations.	2.87	Agree
4. I am not lost when I am doing Mathematics poster and oral presentations.	2.90	Agree
5. I can do Mathematics poster and oral presentations well.	3.00	Agree

Legend: 3.26 – 4.00 Strongly Agree 2.51 – 3.25 Agree
1.76 – 2.50 Disagree 1.00 – 1.75 Strongly Disagree

The responses of student-respondents on their ability to make poster and carry out oral presentations indicate that they are confident in doing these things in a mathematics class. They agree that making posters and carrying out oral presentation are easy for them. This means that they do not experience intense difficulties in performing these tasks. They also agreed that they are not afraid of doing these tasks which indicate that they are confident in completing the tasks given to them. Further, they agreed that they knew how to begin the poster and oral presentations. This means that they have clear and healthy imagination as they did not have trouble in initiating the tasks even this is the first time they do such. They also agreed that they are not lost in executing the assigned tasks and can do these well. The results show and imply that students are confident

doing the assigned tasks and do not find difficulties in carrying out these tasks. This means that poster and oral presentations can be integrated in mathematics since these are tasks that are easy to do and elicit learning. The result is contrary to the result in a study (Nor, 2014) that students revealed that they do not know how to get started with the task given. Thus, it was recommended that clear and better instructions and guidance be given to students in the future. On the other hand, results confirm the study conducted by Koshy (2011) that 80% of students enjoyed doing posters in class and 96% enjoyed reading and looking at their classmates' outputs which mean that they found enjoyment in making posters and benefitted much from it. Students were reported to opt doing posters than any other activity in class and have enormous satisfaction in doing posters as these enhance their learning of the subject (Walker, 2005).

Table 4. General Acceptance of Students on Doing Oral Presentation and Making Poster in Mathematics Class

General Acceptance towards Poster and Oral Presentation	Mean	Qualitative Description
1. I like to do Mathematics poster and oral presentations during Mathematics lesson.	3.27	Strongly Agree
2. I would like to have more Mathematics poster and oral presentations for my Mathematics lesson.	3.47	Strongly Agree

Legend: 3.26 – 4.00 Strongly Agree 2.51 – 3.25 Agree
1.76 – 2.50 Disagree 1.00 – 1.75 Strongly Disagree

The students strongly agreed that they like to do poster and oral presentation in mathematics class which means that these tasks can be integrated once more in the teaching and learning of mathematics. Further, students agreed that they would like to have more of these tasks in other mathematics lessons. The positive response of students implies that making poster and carrying out oral presentation are generally accepted by them. In the study of Nor (2014), 65.4% percent of the students like to do poster and oral presentation in their mathematics class while only 34.6% would like to have more of these tasks in their class. Although they enjoyed doing the tasks and believed of its usefulness, students might possibly be burned-out of doing two sets of poster and oral presentation in a period of less than two months. On the other hand, 78% of students would like to have more poster assignments in the future which indicate that the students enjoyed doing posters in class (Koshy, 2011).

DISCUSSION

The integration of poster and oral presentation in the teaching and learning of Interest and Stocks and Bonds, lessons in General Mathematics, have been found to be significant factors in the improvement of knowledge and understanding of Grade 11 students in the specified topics which implies that these alternative tools may be used to give variety and spice in mathematics classes. As such the positive feedback of students on the use of these tools in the teaching and learning of the topics indicate that they generally accept the use of poster and oral presentation in learning General Mathematics, that they strongly believe of its effectiveness and that they perceive it to be an important contributor to their knowledge and understanding of the topics presented to them. Posters are alternative form of assessment for students to express their learning (Zevenbergen, 1999) and help them deliver message effectively to intended audience (Murdoch, 2014). These may be used to pair with other traditional tasks to foster students' learning (Clark & Paivio, 1991; Manarin, 2016; Logan, et al., 2015) and enhance students' learning of a certain subject (Walker, 2005). On the other hand, oral presentations give learners a pleasurable learning experience by

allowing them to work cooperatively with others (Brooks & Wilson, 2015) and give them worthwhile opportunity to practice language skills (Živković, 2014) by sharing their experiences to their classmates (Kennedy, 2007). Both, poster and oral presentation, are opportunities for learners for effective learning through engaging them in cooperative and collaborative tasks.

CONCLUSIONS

The learning of Mathematics contributed much in the students' logical, critical and analytical skills which enable them to solve classroom problems and even everyday real-world problems. Mathematics in the Philippines basic education are focused on developing students' problem-solving and critical skills which can be taught and learned with much depth through various teaching strategies, methods and tools. Assessment tools may also be altered or changed and made varied so as to evaluate students' progress and learning differently.

In this research, the integration of poster and oral presentations in the teaching and learning of General Mathematics contributed much in the significant improvement in the knowledge and understanding of students in topics on Interest and Stocks and Bonds as indicated in their scores in the pre- and post-test conducted to them prior and after class discussions. Though the tasks are not considered sole contributor to the improvement, these tools were considered by students as helpful in learning mathematics better and deeper. As such, students are helped in learning the specific topics in mathematics through collaboration, cooperation and brainstorming with other students. The poster and oral presentation are considered meaningful experience to them as this was the first time they encounter these tasks. These activities served as platforms of explaining mathematical concepts visually and orally in students' context. Students also showed positive feedback on the use of poster and oral presentation in mathematics class. They believed that these helped them learn math better, are opportunities for them to collaborate with other learners and share their understanding about the topics presented in class. With the positive feedback of students and improvement on their knowledge and understanding, it is therefore recommended that use of poster and oral presentations in mathematics be integrated to mathematics classes to give spice and variety to the teaching and learning process. These tasks are opportunities for students to develop their creativity, critical thinking and communication skills.

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