ENHANCING SCIENCE ACHIEVEMENT OF GRADE 2 STUDENTS THROUGH POWERPOINT INTEGRATION

Patricia C. Triviño
Faculty of De La Salle University Integrated School, Binan, Laguna
MA in Early Childhood Education, De La Salle University, Manila
patricia.trivino@dlsu.edu.ph

ABSTRACT

The use of PowerPoint in improving the assessment scores of students in Science and other courses has been the subject of many debates in recent years. Despite this tool’s popularity, limited experiments have been conducted on its viability as a tool in Science instruction, especially in the field of early childhood education. To address this gap, this research was conducted to explore the use of PowerPoint in improving the Science assessment scores of Grade 2 students. Three class sections in the grade 2 level participated in this comparative study. During Science classes, all sections received the same topics using the following approaches: 1) the traditional method of lecture and chalkboard instruction, and 2) the traditional method with PowerPoint integration. The same sets of quizzes were administered for seven weeks after every topic was delivered. Using ANOVA and T-test to compare the quiz results during the pre-intervention and intervention phases, analyses showed that the mean scores were statistically different only for one-third of the participants. Further investigation through key informant interview revealed that students’ appreciate the use of PowerPoint because of the images shown in the presentations as well as the verbal support of the teacher. All in all, the data gathered did not provide conclusive evidence that PowerPoint has improved assessment scores; however, it was able to show that this tool may help in the learning, remembering, understanding, and critical thinking of the students. The results seemed to suggest that PowerPoint should supplement only the teachers’ instruction, hence, should not be used alone to influence learning and increase the academic performance of young children. More importantly, it should not be used to replace more concrete learning experiences in the early elementary years.

Field of Research: Technology, Multimedia, PowerPoint Presentations, Science Achievement

I. Introduction

In many parts of the world, computers have aided educators in delivering new information to students. It has also become a significant tool for students in producing new information. Several studies over the past decades have indicated the promise of technology in education. Keengwe and Onchwari (2009) cited that there has been increasing interest to the stakeholders “on the integration of technology into classroom instruction to enhance student learning.” Policymakers, educators, parents, and students all recognize the growing importance of integrating technology in teaching and learning. There is pressure for the schools to undergo reforms through technology (Keengwe and Onchwari, 2009).
Multimedia is one modern tool both early childhood educators and their young students can benefit from. Studies reveal that teaching, to a certain extent, has always been integrated with multimedia. When teachers deliver concepts in class using pictures, overhead slides, drawings on the chalkboard, they are actually using multimedia, in a sense. However, there are already modern ways of using multimedia in classes now with the evolution of technology. PowerPoint presentations is one of the more popular tools and perhaps the most available method applicable for teaching. Its unique features such as the incorporation of animated images that help increase interest and understanding of the students make it one of the most preferred tools in teaching. With the aid of PowerPoint in lectures, teachers can focus on the delivery of salient points of the assigned topics.

Despite the widespread adoption of presentation tools, very few experiments have been conducted on their ability to enhance student learning. To address this gap, this action research was conducted to explore how PowerPoint when used as an instructional tool may help in enhancing the Science achievement of Grade 2 students.

II. Theoretical Framework

The theoretical framework for this study was based on two research-based theories: the Cognitive Theory of Multimedia Learning and the Cultural-Historical-Activity Theory (CHAT). Both theories guided this study as it underscored the significant contribution of technology in teaching and fostering student learning.

The Cognitive Theory of Multimedia Learning, also known as the “Multimedia Principle” resulted from a series of researches conducted by Mayers (1997). He believed that “people learn more deeply from words and pictures than on words alone (Mayer, p.47).” The principle further states that when presenting information, it is better to use two modes of representation rather than one. In the learning environment, this may be achieved by varying instructional strategies and utilizing tools that can help foster learning. Based on an extensive line of research on the use of technology in teaching, Mayer believed that multimedia may be one reasonable tool that can address this principle.

![Figure 1. Mayer’s Cognitive Theory of Multimedia Learning](image-url)
Motivated by cognitive science theories, Mayer’s primary concern was to determine how people learn as well as how to help them learn. He was interested in the ways of presenting information that would help people understand including the best means to use words and pictures in order to explain scientific and mathematical concepts. It was largely because of technology and his keen interest on the science of learning and instruction that he has developed the Cognitive Theory of Multimedia Learning.

In his study, Mayer believed that aside from merely adding pictures to words, it was also important to have an understanding of how the human mind works. To achieve this, his theory proposed three (3) main assumptions in relation to learning with multimedia. These are as follows:

1. There are two separate channels for processing information – auditory and visual. This assumption is sometimes referred to as the Dual-Coding Theory.
2. Each channel has a limited capacity.
3. Learning is an active process of filtering, selecting, organizing, and integrating information based upon prior knowledge.

Figure 1 shows a cognitive model of multimedia learning to represent the human-information processing system. It illustrates Mayer’s theory which contends that words and pictures presented to learners through multimedia presentation are processed along two separate, non-conflicting channels. These information then enters the sensory memory through the eyes and ears. Words and images are actively selected by the learner from the sensory memory and enter the working memory where they are organized into a verbal model and a pictorial model. Each channel can process only a few “chunks” of information at a given time in the working memory. The two models are then integrated with prior knowledge retrieved from long-term memory. This integration occurs within the working memory following each segmented portion of instruction offered to the learner in the multimedia presentation (Mayers, 1997). Multimedia offers a wide variety of ways of presenting content or information through computers and/or electronic devices. The PowerPoint program is a form of multimedia for it allows variation in the presentation of information. In addition to the traditional text and graphics, PowerPoint allows for the integration of audio, video, and animation.

In creating an effective and meaningful multimedia learning environment for the students, it is essential for teachers to have an understanding of how students learn. According to the Mayer’s theory, technology, when used in instruction, can help foster student learning. He believed that the learner goes through three important cognitive processes when exposed to multimedia learning. The first process, selecting, happens when incoming verbal information which yields a text base is applied to incoming visual information which yields an image base. The selecting process is then followed by the organizing process wherein selected words are organized into a verbal model and selected images into a pictorial model. Finally, the third process, integrating, occurs when the learner integrates the verbal and pictorial representations with each other and with prior knowledge (Mayer, 1996). Mayer further hypothesized that multimedia instructional messages that are designed in light of how the human mind works are more likely to lead to meaningful learning than those that are not.
Cultural-Historical-Activity Theory (CHAT) - The pedagogical principles of the Neo-Vygotskian Theory which is called the Cultural-Historical-Activity Theory or (CHAT) is another theoretical framework this study was based on. It was developed by neo-Vygotskian sociocultural theory and developmentally appropriate instructions. It emphasizes the use of technology as a powerful teaching tool for increasing learning and development. Because of the theory’s close alignment with developmentally appropriate instruction, the National Association for the Education of Young Children (NAEYC) concurs with the principles of CHAT which stress how technology as a tool can and should influence teaching young children.

Various authors shared that the Cultural-Historical-Activity approach highlights its proponents’ (Vygotsky – 1978 and Luria - 1961) beliefs that children learn best when given opportunities to exercise problem-solving, critical thinking, and creative skills in shared activities with adults and peers. It is through active interaction with adults and materials that young children are able to construct their own knowledge. Rivera et al (2002) added that CHAT also underscores that “learners’ interaction with materials and activity happens in social context of relationships.” In the journal on Information Technology in Childhood Education (2002), Rivera et al (2002) further established that “technology provides the teacher with unusual and valuable forms of assistance. But her dialogically gauged assistance to the young readers situates instruction where literacy itself lies - in the social nexus.” It is in adult-children interactions and manipulation of materials in the environment where minds are constantly at work, especially for young children who are considered to be like sponges as they absorb everything that they sense from their environment.

In the educational context, learning among students progresses when scaffolding is provided by the teacher through their active engagement in discussions as well as in instructions. The Zone of Proximal Development (ZPD), as described by Vygotsky, is a condition when learners are “permitted to perform at a level higher than would be possible alone (Rivera, et al, 2002).” Further, Tharp and Gallimore (1988), as cited in Rivera et al (2002), stated the following about the Zone of Proximal Development:

“A child’s developmental level is different from the ZPD. The former describes a situation where an individual is able to perform a given activity unassisted. In contrast, teaching in the proximal zone consists of assisting a child’s performance at a point that requires assistance” (p.175).

Rivera et al (2002) supported the above statement by citing its consistency with the principles of child development and learning, as declared by the NAEYC (1996): “development advances when children have opportunities to practice newly acquired skills as well as when they experience a challenge just beyond the level of their present mastery” (p.9).

The CHAT approach supports and confirms this study’s findings that technology alone is not sufficient when used in delivering concepts and developing expertise among learners. Technology-infused teaching would still require the teacher’s participation because the former does not fully provide opportunities for socialization as well as simulation of the emotional and value context in which cognitive development is situated (Rivera et al, 2002).
Justified by the CHAT theory and empirically derived from the existing corpus of research across age and grade levels, cultural and linguistic groups, and subject matters are the standards for effective pedagogy as published by the CREDE group on the back of its research on effective education for at-risk students (Tharp, 1989, 1995; Dalton & Youpa, 1998; Tharp, Estrada, Dalton, & Yamauchi, 2000). The NAEYC, National Council of Teachers of Mathematics, by the various Standards publications of the National Board of Professional Teaching Standards, and the National Association for Bilingual Education are highly congruent with these standards.

The Five Standards for Effective Pedagogy are:

I. Joint Productive Activity: Teachers and students producing together.
II. Developing Language and Literacy Across the Curriculum
III. Making Meaning: Connecting School to Students. Lives
IV. Teaching Complex Thinking: Cognitive Challenge
V. Teaching Through Instructional Conversation

Rivera et al (2002) agreed that “when experts and novices work together for a common product or goal and have opportunities to converse about the activity, learning is likely.” They further stated that in Standard I: Joint Productive Activity: Teachers and students producing together, even the youngest learners as well as mature adults develop their competencies in the context of joint activity in natural (non-formal) settings. This pedagogy standard also suggests that “common motivation provided by a joint goal inclines all participants to offer and receive assistance, since it is in everyone’s best interest that the goal is reached. (Rivera et al, 2002).” Social relationships, as highlighted in this list of effective teaching standards, reinforces “shared activities” as an essential context for a child’s learning.

In its Standards for Early Childhood Professional Preparation, the NAEYC (1996) had this to say about learning in social relationships:

“Each child has strengths or interests that contribute to the overall functioning of the group. When children have opportunities to play together, work on projects in small groups, and talk with other children and adults, their own development and learning are enhanced. Interacting with other children in small groups provides a context for children to operate on the edge of their developing capacities. The learning environment enables children to construct understanding through interactions” (p.10).

Another essential pedagogical standard where the present study is anchored on is Standard II: Developing Language and Literacy Across the Curriculum. This essentially stresses the importance of speaking, reading, and writing in achieving academic success and affective development particularly in exercises where students are encouraged to express themselves, in written or verbal form, during shared activities in various settings. One of the guidelines proposed by NAEYC (1996) is that curriculum should provide opportunities to
support children’s home culture and language while also developing all children’s abilities to participate in the shared culture of the program and the community. (pp. 13).

**Standard III: Making Meaning: Connecting School to Students’ Lives** is another significant link that anchors this present study. It emphasizes the various social contexts and personal circumstances students have outside of school and the important roles teachers play as they make connections between school and students’ lives. Rivera et al (2002) mentioned that this teaching standard should be an encouragement for teacher educators “to draw on students’ familial and local context of experience. The NAEYC, in its guidelines for appropriate developmental activities, likewise promoted the incorporation of a wide variety of experiences, materials and equipment, as well as teaching strategies in constructing curriculum to accommodate a broad range of children’s individual differences in prior experiences, maturation rates, styles of learning, needs, and interests. (pp. 11). The results of this study are evidences of the impact of the students being able to identify with and relate to the images and illustrations shown to them with the use of technological tool - PowerPoint presentations. Being able to see familiar situations and images provided wonderful opportunities for the students to make connections, develop their imagination, and construct their own learning. Standard III further indicated the use of technology in the classroom. It acknowledged the use of technology as providing avenues for young children to make connections between their home-based activities and the classroom (Rivera et al, 2002.)

The verbal support provided by this researcher alongside her use of a technological instructional tool in the classroom is substantiated in **Standard IV: Teaching Complex Thinking: Cognitive Challenge**. According to Standard IV, involving students in challenging tasks such as complex thinking paves the way for the universal principle of effective instruction. Children are capable of learning more than the basics if opportunities for critical thinking are provided. Standard IV further implies that:

> Cognitive complexity will be learned if it is taught. Through the activity-and-language based interaction of the CHAT approach to pedagogy, challenge can be appropriately leveled. The appropriate level of cognitive challenge is to be found in the ZPD. For development to occur, challenge must constantly be set at the point where assistance is necessary.

The NAEYC (1996) believed that when students are given challenging opportunities through questioning, problem solving, and critical thinking exercises, teachers are actually helping them to extend their learning (p. 12.) Additionally, **Standard V: Teaching Through Instructional Conversation** deals with how students’ engagement in thoughtful and accountable conversation about cultural artifacts teaches students. Once again, in this teaching standard, helping students develop the art of questioning, rationalizing, problem solving, and justifying promote higher order thinking skills. The NAEYC (1996) highlighted the importance of assessing young children’s progress and achievements during ongoing, strategic, and purposeful activities. The organization further stated that the results of such dialogical assessment can be used to benefit children by adapting curriculum to developmentally appropriate tasks and by meeting the developmental and learning needs of children during and beyond the classroom activity. Engaging young children in instructional
conversations are ways of exploring students’ past experiences and knowledge. It also affirms their value and relevance of learning.

In order to increase the connections with and between the students, teachers should ensure that the contents delivered to them are meaningful or even in life-like situations. Standard V, according to Rivera et al (2002) is the capstone of effective education. It can only happen in a community of learners where instructional conversation begins. In informal settings or learning environments where socialization takes place, not only are the students developing higher order thinking but also learning about community values and human relationships. Rivera et al (2002) also believed that all learners should be given the opportunity to learn from these experiences. Technology has indeed contributed immensely to the development of the world, but these standards of effective teaching are principles that would help the learners learn and develop more as teacher educators with 21st century qualifications prepare them for the 21st century challenges they will be facing in the real world.

III. Methodology

The participants of this study consisted of eighty-four (n=84) Grade 2 students, ages 6-8 from the three sections: A, B, and C of De La Salle University – Integrated School. The following instruments were used for this study: PowerPoint presentations, Quizzes, and Open-ended Interviews. Phase 1 of the study was the pre-intervention. This phase took a total of eleven (11) school days: 10 days of instruction and 1 day for the administration and checking of the participants’ quiz. The second phase was the intervention where the use of PowerPoint was incorporated in delivering the week’s lesson. It was implemented for a total of seven (7) weeks with one section receiving it twice and at an identified day during the week while 2 other sections learning the same concept through the conventional method of lecture and discussion. The days when the intervention was employed were purposively selected and these were Mondays, Wednesdays, and Fridays when a concept was being introduced, reinforced, and concluded, respectively. All in all, six (6) PowerPoint presentations were shown during the intervention implementation phase. At the beginning of every week after a concept was taught, the researcher administered a written quiz to assess the participants’ learning. All quiz results were recorded and compared to the baseline data of the participants. The post-intervention phase of the study was conducted after the seventh and last week of intervention implementation. The researcher conducted an open-ended interview with seven (7) purposively-selected students who served as this study’s key informants. A set of meta cards were also presented to the key informants during the interview to know how they ranked different classroom activities during science classes.

Table 1 shows the implementation plan for the application of the intervention. The schedule for each section was randomly designed using the chance method. As can be seen, all 3 sections were taught the same concepts per week but only 1 section received the intervention while the other 2 received the traditional method.

IV. Results
Based from the intervention given to the classes and the quizzes administered, the following results were gathered: Section 2A obtained higher average scores in classes where PowerPoint was utilized (Figure 2). With the instruction tool - PowerPoint used for reinforcement of the lessons, results seem to indicate that it may have had a significant effect in the learning processes of the students. The topics wherein PowerPoint was integrated were as follows: 1) Scientists and Inventions 2) Needs of Animals.

In the case of Section 2B where PowerPoint was used as summary of the weeks’ lessons, results seem to indicate no significant effect on the students’ academic performance (Figure 3). For the duration of this study, PowerPoint was utilized twice in Section 2B for the topics: 1) Laboratory Tools/Safety Rules in the Laboratory ; and 2) Care for the Earth. In both instances, the performance of the students in the quizzes present no relative change when compared to their quiz results in classes where no PowerPoint was used. Although not conclusive, this may be an indication that PowerPoint may not have helped in enhancing the students’ achievement.

### Table 1. Implementation plan of the intervention.

<table>
<thead>
<tr>
<th>Section</th>
<th>Scientific method</th>
<th>Scientists and Inventions</th>
<th>Laboratory tools and safety rules in the laboratory</th>
<th>Land and Water Animals’ Similarities and Differences</th>
<th>Needs of Animals</th>
<th>Care for the environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2A</td>
<td>Traditional Method No PowerPoint</td>
<td>Traditional Method Plus PowerPoint as introduction</td>
<td>Traditional Method No PowerPoint</td>
<td>Traditional Method No Powerpoint</td>
<td>Traditional Method No PowerPoint</td>
<td>Traditional Method No PowerPoint</td>
</tr>
<tr>
<td>2B</td>
<td>Traditional Method No PowerPoint</td>
<td>Traditional Method No PowerPoint</td>
<td>Traditional Method Plus PowerPoint as reinforcement</td>
<td>Traditional Method No Powerpoint</td>
<td>Traditional Method No Powerpoint</td>
<td>Traditional Method Plus PowerPoint (as summary)</td>
</tr>
<tr>
<td>2C</td>
<td>Traditional Method Plus PowerPoint as introduction</td>
<td>Traditional Method No PowerPoint</td>
<td>Traditional Method No Powerpoint</td>
<td>Traditional Method No Powerpoint</td>
<td>Traditional Method No Powerpoint</td>
<td>Traditional Method No PowerPoint</td>
</tr>
</tbody>
</table>

The performance of Section 2C in all the six (6) quizzes administered during the Intervention Phase show the opposite of Section 2A’s performance (Figure 4). Their performance experienced a decline in their average scores as compared to their quizzes where no PowerPoint was used. For the two class sessions in 2C where PowerPoint, used for introduction, was utilized, the topics: 1) Scientific Method, and 2) Comparing Land and Water Animals were taught. Could these results be due to timing when PowerPoint was used or the complexity of the subject matter?
To test if there was a significant difference between the mean scores for all six (6) quizzes per section, an Analysis of Variance (ANOVA) – One Way Test was performed. In order to further analyze the pair of mean scores specifically on where the difference lies, a T-Test was performed. The pairs of scores subjected to T-Test were those that were closer to each other in terms of the period of administration. According to Bluman (1998), the F test is used to compare two or three means. This technique is called the analysis of variance, or ANOVA. It is used to test claims involving three or more means. In this study, a single factor or one-way ANOVA was used to test the null hypothesis that the means of the three populations are all equal.

The ANOVA results for all sections showed that there was a difference between the means and that the scores in the different quizzes are not all equal. The results also indicated that at least one mean is different since the values obtained for F is greater than the critical values (Fcrit). For three groups, the ANOVA can only show whether or not a difference exists among the three means. It cannot reveal where the difference lies, hence, if the ANOVA indicates that there is a difference among the means, other statistical tests should be used to find out where the difference exists (Bluman (1998).

To determine where the difference lies, a T-test was conducted between pair of means for each section. Results showed that during the Intervention Phase on Section A, in Quiz #1 (without PowerPoint) and Quiz #2 (with PowerPoint), there was a significant difference between the mean scores such that the p-value (0.000032) is lower than alpha (0.05). There was also a significant difference between mean scores for quizzes 3 (no PowerPoint) and 5 (with PowerPoint) such that the p-value (0.00324) is lower than alpha (0.05). Looking at the average mean scores for these quizzes, all the mean scores for quizzes where PowerPoint was used were higher than those without the use of PowerPoint in the lecture. However, these patterns were only true for Section A. In Section B, there was no significant difference between Quizzes #2 (without PowerPoint) and #3 (with PowerPoint) at alpha = 0.05 and p-value = 0.4. There was a significant difference between Quizzes #5 (without PowerPoint) and #6 (with PowerPoint) at alpha = 0.05 and p-value = 1.27 x 10^-8. However, looking at the mean scores for Quizzes #5 and #6, the one that was higher was in quiz 5 where no PowerPoint was used. Similarly, the same results were obtained for Section C where all the mean scores were significantly different but the mean scores for the quizzes where PowerPoint was used in the lectures were not higher. Comparing the mean scores of Quizzes #1 (with PowerPoint) and #2 (without PowerPoint), the difference is significant at alpha = 0.05 and p-value = 0.00021, however, when one examines the mean scores, Quiz #2 is higher than Quiz #1. Similar results for Quizzes #4 (with PowerPoint) and #5 (without PowerPoint) at alpha = 0.05 and p-value = 0.0035, the mean score of Quiz #4 was lower than Quiz #5.

In order to further validate the above results using the statistical tools, an interview involving key informants was conducted to find out their perception on the use of PowerPoint presentations in Science classes. The results of the interview were clustered according to three main themes namely: appreciation for images shown, teacher’s verbal support, and the use of PowerPoint in classes.

**Figure 2.** Comparative performance on intervention quizzes of Section 2A.
Appreciation for Images Shown

Out of seven (7) respondents, all favored PowerPoint presentations. They expressed appreciation over the instructional tool because of the learning they gained from it and the images shown. They were unanimous in stating how they liked the still pictures as well as the animated graphics because these added fun and interest to the lessons. The visual images, particularly of objects, organisms, and scenarios as discussed in the lessons, helped reinforce the lessons as well as extend their learning beyond the classroom walls. These also substantially aided in eliciting prior knowledge, introducing new concepts, and accessing information about different places without having to leave the classroom.

The students’ responses in the open-ended interviews conducted seemed to address Research Question #3 “What are the perceptions of Grade 2 students on the use of PowerPoint?” They favored the use of PowerPoint in their science classes and agreed that it allowed them to remember, understand better and think deeper about the lessons. Specifically, they cited that the PowerPoint presentations made learning easier.
Furthermore, they liked being able to relate the graphics presented to real-life objects and situations. The students had this to say:

“We learn when we see pictures. It shows us information of what the topic is teaching us. It is also because it is more fun with pictures because it is like a movie..the kind of movie that we learn something from.”

“It helped me learn about our lessons more. You also teach when you show pictures.”

“It can help you think about the lesson. The pictures and words that you see by watching powerpoint can help you learn the lesson more.”

“The images made us feel like we were on a field trip. We did not have to go out of the classroom to know how something looks like.”

“The pictures...not only the color, the look and how it is related to the topic. And so we learn from you also...sometimes if its video, we will know how it looks...if it’s a PowerPoint or video, we understand what you mean, we learn more...you also teach us from the video. We learn when you talk and show us the video or PowerPoint.”

In the above student responses, it can be noted too that the students appreciated the PowerPoint that had graphic presentations. In fact, they perceived PowerPoint as helpful in raising their interest level in the Science lessons delivered in class. With presentation
graphics, teachers may not only be able to show more pictures, cover and introduce more lessons in less time but also enjoy extra hours for discussions and questioning. In their paper presented to the Society for the Teaching of Psychology, Ludwig et al (2004) explained that “a good picture is worth a thousand words and a bad one needs explanation. He added that using “the right pictures, videos and graphics can generate productive and stimulating presentations which can eventually lead to greater retention, application to new situations, and performance on assessments. However, if these materials are not used well, they may also be “a distraction to learning and ultimately unproductive.”

**Teacher’s verbal support**

Four (4) out of seven (7) respondents cited the teacher’s explanations alongside the PowerPoint presentations as helpful in making them get good scores in the quizzes. This result support the study of Erdemir (2011) where verbal support was shown to be helpful in understanding abstract concepts and complex graphs. He also recommended that the use of PowerPoint in Physics classes be with the instructor’s reinforcement especially when applied to classes of students with different abstract reasoning abilities. As for the rest of the respondents, they stated that the images shown in the presentations already explained the concepts even without the verbal support of the teacher.

**Use of PowerPoint in Science classes**

Results of the interview revealed that five (5) out of seven (7) respondents’ preferred the use of PowerPoint presentations in this researcher’s Science classes. The other two (2) however, cited their preference over other activities and materials that were not already present in their Science textbooks. Additionally, the respondents had this to say about their preference for the use of PowerPoint in their classes:

“Some powerpoint presentations, we watch it as a movie. It’s like the teacher wants us to be happy that’s why the teacher makes a video so that we will learn and at the same time have fun.”

“It also helped me to understand more. When you show the class the powerpoint presentation, its like you are teaching us two times already: 1) when you teach us the lesson 2) when the video is shown for us to learn more”

“It makes us understand more your teachings and when it’s fun we will not forget because some people say that when learning is fun, you won’t forget it.”

As to the Key Informants’ responses on their preferred activities in the Science classes, 3 out of 7 cited ‘discussions’ as their top choice. The rest of the respondents had their own preferences as to the class activities which were helpful to them such as experiments, Science in Action, and worksheets. This researcher noted that more than half of the respondents ranked ‘role playing’ as their least choice.

The above-stated students’ responses seem to suggest that PowerPoint presentations help in learning more, better understanding, and retaining information and concepts taught in class. These results, however, do not signify that other instructional tools and strategies do
not contribute to the learning processes of young children. However, it may support the position earlier stated in the review of literature that PowerPoint enhances students’ Science achievement, particularly in their test scores.

As for Research Question #1 – How did PowerPoint Integration improve the performance of the Grade 2 students in Science?, the results of the ANOVA test and T-Test seemed to provide evidence that the use of PowerPoint in the Science classes helped enhance their Science achievement as shown in their general performance in the quizzes. But then again, their performances in the different topics may not be conclusive given that the other two sections did not produce the same results.

The results of the ANOVA, T-test, and the open-ended interviews, however, seemed to suggest the topics that favorably impacted the quiz scores of the participants in the study, specifically Section 2A. This addresses Research Question #2: Which topics had significant impact on the scores using PowerPoint? These topics are: Scientists and Inventions, Needs of and Care for Animals, and Care for the Environment.

V. Discussion

Using the results of the ANOVA and T-test for Paired Two Samples for Means, the use of PowerPoint may have had a positive effect on the students of Sections A but not on the other two sections. These results may be attributed to several factors. The factors which may have caused this are as follows:

1. Level of Difficulty of the Topic and the Quizzes:

During the Pre-Intervention Phase, the topic from which the first quiz was based is the Basic Process Skills in Science. Since this formed as an introduction to the subject, the lessons were relatively easy. The teacher explained each of the skills using simple examples and activities that were practical and realistic. The first quiz administered to students was likewise practical as the students were able to apply the concepts learned through easy observing, hypothesizing, comparing, and classifying exercises. The results of this quiz were relatively high because the topic may have been interesting and easy for the students.

Conversely, the first topic during the Intervention Phase – the Scientific Method, dealt with understanding the scientific steps involved in arriving at a problem and formulating a conclusion based on an experiment done. Given the young age of the students, the said topic may have been too complex and challenging for many of them, thus, the low scores in Quiz #1. Despite the initial use of the PowerPoint (on Section C) alongside the instruction of the researcher, understanding the steps in the Scientific Method and constructing their answers to the questions in the quiz may have been a difficult task for the students. In the case of 2A, however, integrating PowerPoint in the lecture on Scientists and Inventions, a relatively easier topic as compared to the topic on Quiz #1, may have positively impacted their performance in Quiz #2. Additionally, the significantly lower mean scores of the 2C students between Quizzes #4 (with PowerPoint) and #5 (without PowerPoint) may have been due to the difficulty of the Quiz #4 as compared to Quiz #5.
Likewise, this factor may have had an impact on the mean scores of Section 2A in their Quizzes #3 and #5, specifically on the topics: Laboratory Tools and Safety Rules in the Laboratory and Needs and Care for Animals, respectively. Between learning about laboratory tools - its uses and safety in the laboratory (using the conventional method of discussions and lecture) and the needs of and care for animals, (with PowerPoint integration), the students may have found the latter to be more interesting, hence, their satisfactory performance in Quiz #5. Further, the visuals incorporated in the PowerPoint presentation used in the lesson on animals may have fostered the learning of the 2C students.

As for the significant difference in the mean scores of Quizzes #5 (without PowerPoint on the topic - Needs and Care for Animals) and #6 (with PowerPoint on the topic – Care for the Earth) for Section 2B, the latter topic and quiz administered may have been easier for the 2B students to understand given that the concept taught was easier, realistic, and practical.

Using now the results of the ANOVA and T-test, this factor may be true to Sections B and C (section where PowerPoint was first used) for Quizzes #1 and #2. Aside from the complexity of the above-stated concepts, at least one or a combination of the other factors stated below could be possible reasons that may have caused the results of mean scores for Sections 2 of the given quizzes.

2. Individual Learner Differences

The distribution of students in the Grade 2 level is heterogeneous. Given the fact that not all learners are the same, not every student is expected to give the same level of performance in assessments/quizzes. Likewise, the strategies used in the classes do not address all the varying learning styles of the students. Some students may have performed better in the quizzes administered and at the same time, there may have been students who did not do very well in the quizzes. Because of this factor, the results of the students’ assessments may also widely vary.

3. Timing of PowerPoint Use

As indicated in the methodology, PowerPoint integration in the Science lessons was applied using three different settings: as a tool for introducing a new topic, as reinforcement of the lessons, and as summary. For Quizzes # 2 and #5, PowerPoint was used on Section 2A to introduce the topics: Scientific Method and Land and Water Animals’ Similarities and Differences.

Since the intervention - PowerPoint presentations, was used at the beginning of the week - when the concepts were being introduced to the students, this researcher had to apply other instructional strategies alongside the discussions/lectures given for the rest of the week. These were in the form of worksheets, Science-In-Action or simple experiments, and group activities. These strategies may have been contributory to the results of the students’ Quizzes #2 and #5.
4. PowerPoint Design Used

In the methodology of this study, it was stated that the PowerPoint presentations used in the science classes were mainly revised versions of presentations downloaded from the various sites on the internet, hence, the wide variation in the design of the materials. For the most part, PowerPoint #1 specifically, consisted largely of text. In PowerPoint #5, however, the presentation generally consisted of various images of real animals. Out of the six (6) PowerPoint presentations shown to the students, it was only the topic on Care for the Earth where an original, researcher-constructed PowerPoint was used. This presentation consisted primarily of images of real situations and the environment. The use of text was also very minimal for all the slides in the presentation. As for the significant difference in the mean scores between Quiz # 5 and #6 for Section 2B, the PowerPoint design may have benefitted them as proven by the higher ratings they obtained in Quiz #6. To add, the visuals incorporated in PowerPoint presentation #6 may have stimulated their interest in the lesson presented.

As has been noted from the T-test, there was no significant difference between the mean scores of Section 2B in their Quizzes #2 and #3. A factor which may have caused this is the use of animated cliparts in the PowerPoint used on the topic – Laboratory Tools and Safety Rules in the Laboratory. The content of the PowerPoint presentation on the said topic may have been extraneous and the images shown over-stimulated the Section 2B students.

VI. Conclusion

According to Fedisson and Braidic (2007), the questions on how technology impacts student achievement continue to grow. They cited the use of different types of tests, personal and social factors as well as the students’ other activities as possible reasons for dramatic changes in scores. Keengwe and Onchwari supported this as they stated that technology is not a substitute for good instruction; effective teachers strive to integrate technology into their lessons to engage multiple learning styles of diverse learners and abilities in the classroom. When a teacher creates intellectually engaging technology activity using any piece of software or object, it will promote children’s learning and development.

Based on this study, the results of the assessments and interview indicated the key role teachers play when delivering concepts to students. It must be remembered that the use of technology, particularly PowerPoint, should supplement only the teachers’ instruction. Verbal support and explanation, as drawn out from the results of this study, remain to be vital factors when using PowerPoint presentations in Science classes. Correspondingly, it would be helpful to know that the appropriate topics, manner, timing, choice of materials to be used, audience and desired goals should be primary considerations when supplementing classroom instruction with PowerPoint presentations. Essentially, teachers should exercise care in using technology in the classrooms. It should not be used to replace more concrete learning experiences in the early elementary years.

The data gathered suggested that there is more than one path to optimize student learning, and performance. It is the teacher’s challenge to adopt appropriate technology to support and create different types of learning environments that replicate and expand the traditional classroom to enhance students’ learning experiences and maximize their performance. The
use of PowerPoint as a supplement teaching tool in Science should be designed appropriately. It can be maximized if teachers incorporate images that relate to the students’ everyday life. It is crucial for teachers to know when and how to use PowerPoint so that they are able to maximize its pedagogical utility, potential for learning, as well as enhancing students’ academic performance. Being able to do these may help in improving the delivery of lessons and more importantly, connecting to the students.

In conclusion, technology - PowerPoint presentations in particular, offers significant opportunities toward improving teaching as well as the ability of students to learn and achieve academic success. With the increasing demand for technology integration in schools, computer programs such as PowerPoint will play a very important role in effective education.

VII. Plan of Action

The following are ways in which the study could be further improved:

On PowerPoint Presentation Material
- Consider the uniformity and consistency of presentation style. Different presentation styles and designs used could possibly produce different results.

On Testing the Utility of PowerPoint as an Instructional Tool
- Consider gathering more baseline data and a longer implementation period
- Investigate the utility of PowerPoint presentations in other disciplines and its impact on human learning.

On Teacher Training
- For the school administration to include in the teachers’ training program the use of technology as an instructional tool so that they are able to maximize its integration in the curriculum; Professional development programs may also include training on creating effective PowerPoint presentations as well as delivering oral presentations in classes.

On Future Researchers
- Study may be replicated on younger children, in the Preschool and Grade 1 levels: ages 4 to 6. Aside from giving a PowerPoint presentation on developmentally appropriate topics for them, the images, text, videos and the verbal support of the teacher should be carefully planned to suit the age and the developmental characteristics of the students.

Bibliography


