IMPACT OF INTEGRATION OF MULTIMEDIA IN TEACHING SCIENCE

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ABSTRACT

This research aimed to determine on how multimedia technologies can be of great help on students' achievement, and what learning exercises can be proposed for the enhancement of learning. This research was conducted at Nangka National High School of Nangka, Balamban, Cebu, Philippines. The experimental method was employed to gather data. The result of the pre- test showed no significant differences, which in turn proves the equivalence of the two groups. Meanwhile, the result of the post test showed that there were significant differences between the experimental group and the control group at a significance level of 0.05. The students in Chemistry showed positive attitude towards the subject and towards the integration/ use of multimedia technology. It is highly recommended that the administration and the faculty should work hand in hand in maintaining the environment conducive for learning by providing multimedia technologies inside the classrooms so that learnings will be smoothly delivered with authenticity.

Keywords: *Multimedia, Teaching Science, ICT Integration, Post and Pre- test, Experimental*

I. INTRODUCTION

Teachers' expertise around the world is finely tuned to the teaching and learning setting. This expertise is blending and responding to the introduction of the digital world since nowadays people are living in rapid changes brought about by advances in technology and information.

In teaching science, the importance of having good books to read, quality apparatuses, and electronic devices such as SMART TVs, smartphones, tablets, computers, laptops, overhead projectors and others, in the learning environment are of great help to hasten the learning of the students. The latter can stimulate the manipulative and mental skills using the scientific methods in directing the learners into finding facts. In this digital era, there are many advances in technology that have helped education to become more readily available or accessible. Inventions such as the online classroom have improved education in a significant way and it is growing around the world every day. However, majority of the teachers still using the traditional method in teaching.

Multimedia plays an important role for better achievement especially in science teaching. Multimedia, is the combination of various digital media types such as text, images, sound and video, into an integrated multi-sensory interactive application or presentation to convey a message or information to an audience. Understanding the ways technology has helped with education and the actual impact this made will help you to see how vital technology has become in the education world. Using this approach can deepen student learning by supporting instructional objectives. However, it can be challenging to select the "best tech tools while not losing sight of your goals for student learning. Once identified, integrating those tools can itself be a challenging eye-opening experience. As technology grows, student's learning will become more complex. They may become more curious and selective of their learnings. Technological advances have changed the world of education in the 21st century. Knowing about these advancements and the impact they have on education around the world can will show just how essential technology is to education. .

In addition, adequate laboratory facilities are also significant factors in the achievement of students in the subject science. As John Dewey cited in his philosophy, "Learning by Doing" students are best learned if they have experienced hands on with actual materials. Without opportunity to carryout supporting experiments there is little chance of achieving the goal with lasting effect which characterizes modern science teaching; this process focus on learning by inquiry and concept formulation arising from individual student's participation in laboratory activities. (Peterson, 2005). In order to demonstrate the process of inquiry in the teaching of modern science, Peterson emphasized that the teacher must be committed to the use of the laboratory as the heart of the investigation approach leading to inquiry teaching and self- discovery. It must give room for students to plan, produce and profit from their own mistakes until evidence of what is forthcoming can lead to satisfactory conclusion. It is along this trend that this study is proposed to find out the detrimental factors that influenced the learning of the students in studying science as part of the curriculum that plays a great role for the betterment not only for self alone, but for the nation as a whole. It brings a clear view on how the lack of facilities hinders or block the learning. A growing body of research has found that school facilities can have a profound impact on both teacher and student outcomes. With respect to teachers, school facilities affect teacher recruitment, retention, commitment, and effort. With respect to students, school facilities affect behavior, engagement, learning, and growth in achievement. Thus, Researchers

generally say that without adequate facilities and resources, it is extremely difficult to serve large numbers of students with complex needs since every person is born unique and possesses and innate skills and talents which need to be cultivated and multimedia technologies are essential vehicle in carrying out activities smoothly and effectively with meaningful results.

Cognitive Theory of Multimedia Learning (Mayer) states that Multimedia can be identified as an environment in which text, pictures, sound, animation, video or a combination of these media are used for students to access information. Using multimedia material as an option with texts, pictures, animations and videos can make the learning easier (Mayer, 2003). It is also situated in Paivio's dual coding theory (Paivio, 1991). Paivio explains that both hemispheres of the brain are used actively in learning environments in which both visual and textual information items are used. The multimedia software is developed according to the principles of cognitive theory of multimedia learning (CTML) (Yue et al., 2013). Cognitive theory of multimedia learning and cognitive load theory give information about learning from words and visuals. According to these theories suggested, there are two distinct channels in the human information processing system, one of them processes information presented in a visual format and the other processes information presented in an auditory or verbal format (Issa et al., 2011). The capacity of these channels is limited. While learning, different parts of human memory system work. Issa et al. (2011) explain the cognitive learning process in their study as given below: Sensory memory can get unlimited information through verbal and pictorial stimuli, but only limited amount of these stimuli can be processed at any given time. The selected information is transferred to the working memory. There, the information is organized and this takes a significant amount of time. Piaget in his theory of Cognitive Learning and Development believed that children take an active role in the learning process, acting much like little scientists as they perform experiments, make observations, and learn about the world. As kids interact with the world around them, they continually add new knowledge, build upon existing knowledge, and adapt previously held ideas to accommodate new information. Piaget intends that, teachers provide children with the opportunities to explore to its fullest range of thought at a given stage and to build the strongest possible foundation for succeeding stages. It is this kind of active exploration which make children aware of the limitations of physical plant is concerned. Over-flowing of classes and limited facilities are problems that face nearly every school at some time or another. In the process of solving problems in science, children learn to observe, investigate, experiment in order to find answers to their own questions. They learn to withhold judgment until they have accumulated the evidence of many experiments. Based on the research of Corrienna and the group in 2017, it says that beside biology and physics, chemistry is one of the strands in science. Chemistry deals with materials and concepts that are not possible to be seen in real life; they are more abstract than real. It requires for both teachers and students to use their imaginations and visualizations of things.

Therefore, with the improvement of technology, chemistry learning has to be more attractive and interactive to provide meaningful learning to the student (Pryor & Bitter, 2008). Technology, as a teaching aid, can provide the picture of the concept behind the process that is applied. Innovative and interactive approaches to teaching and learning of chemistry engage students more intimately as compared with the customary classroom method (Lerman, 2003). Students of this new age, possess noteworthy information and communication technology skills. It would then be advantageous to utilize these cultivated or enhanced skills in the classroom for the educational benefit. For instance videos add the advantage in classroom learning because they reflect and recognize the intensely diverse learning style of the present-day generation of students (Jeremy et al., 2016).

II. MATERIALS AND METHODS

This study made use both the descriptive-quantitative and the experimental design. These methods attempted to assess the use of multimedia technology in teaching Science 10, (Chemistry) students in Nangka National High School, Balamban, Cebu, Philippines, during the School Year 2018-2019 as basis for learning exercises.Pre and post-tests were administered with used of the validated items to determine the impact of the use of multimedia in the teaching of Science. Distribution of the standardized survey questionnaire was conducted to assess the perceptions of students of both control and experimental groups on the use of multimedia in teaching-learning activities in science. Data were treated using weighted mean, mean, t-test, and p-value. Statistical Software (SPSS) Version 16 was used for data computation.

III. RESULTS AND DISCUSSION

Pre-Test Performance of the Students before the Use of Multimedia in Teaching Science 10 Competencies in Boyle's Law

Control group had the following performance's weighted means during the pre-test; 17.17 in understanding how gases behaved based on the motion and relative distances between gas particles; 14.11 in investigating the relationship between volume and pressure at constant temperature of a gas; and 11.13 in calculating changes in volume and pressure at constant pressure with a total of 9.68. Experimental Group had the following performance's weighted means during the pre-test; 19.50 in understanding how gases behaved based on the motion and relative distances between gas particles; 14.89 in investigating the relationship between volume and pressure at constant temperature of a gas; and 13.67 in calculating changes in volume and pressure at constant pressure with a total

9.95.The results showed that the two groups had different weighted means on every skill before the experiment was conducted.

Post-Test Performance of the Students before the Use of Multimedia in Teaching Science 10 Competencies on Boyle's Law

The first competency which was"Understanding how gases behaved based on the motion and relative distances between gas particles", the experimental group gained a p-value of 0.17. The second competency which was "Investigating the relationship between volume and pressure at constant temperature of a gas", gained a p-value of 0.03. Lastly, the third competency which was "Calculating changes in volume and pressure based on Boyle's law, resulted to a p-value of 0.43. The findings also revealed that the two (2) groups had different weighted means on every skill, however the results varied in every competency. Since the total p value is 0.00 which is less than 0.05, which means that there was a significant improvement on the science performance after the experiment on the integration of multimedia in teaching Science 10.

Significant Mean Difference between the Pre and Post Performances of the Control Group

The pre- test result of the Control group had a weighted mean of 17.17 in Understanding; 14.11 in Investigating; and 11.13 in Calculating pressure and volume at constant pressure. The total weighted mean was 9.68. The Post- test had a weighted mean of 17.67 for Understanding, 16.67 for Investigating; and 19.40 in Calculating pressure and volume at constant pressure. The total weighted mean was 13.83. The computed p-value of 0.82 for understanding; 0.49 for investigating; and 0.06 for calculating showed no significant difference between the pre-test, and the post-test for the control group. However, the total p-value for the three competencies between the pre-test and the post-test of the control group was 0.00 which was less than 0.05 revealed that there is a Significant improvement of the learners on the science performance after treated with traditional approach.

Significant Mean Difference between the Pre and Post Performances of the Experimental Group

The pre- test result of the Experimental group had a weighted mean of 19.50 in Understanding; 14.89 in Investigating; and 13.67 in Calculating pressure and volume at constant pressure. The total weighted mean was 10.0. The Post- test had a weighted mean of 26.33 for Understanding, 27.89 for Investigating; and 22.87 in Calculating pressure and volume at constant pressure. The total weighted mean was 19.9. The computed p-value of 0.11 for understanding;showed that, experimental group had no significant difference between the pre-test, and the post-test in the competency of understanding. The p-value of 0.00 for both investigating; and calculating showed a significant difference between the pre-test, and the post-test for the experimental group. The total p-value for the three competencies between the pre-test and the post-test of the experimental group was 0.00 which was less than 0.05 also revealed that there is a Significant improvement of the learners on the science performance after treated with experimental approach.

Perceptions of Teachers on the Use of Multimedia in the Teaching of Science 10

The top five highest ranked items as perceived by the teachers on the use of multimedia in the teaching of Science 10 in Nangka National High School, Nangka, Balamban, Cebu, Philippines were:"Teachers who have access to ICT resources are likely to integrate technology in teaching-learning process.", " Students are more focused in learning the subject if this is projected on the screen via sky share or screen mirroring", I find Multimedia Technology (Smart TV/ cellphone) to be an important part of the classroom", " I am motivated to find ways to use SMART TV or computer in my classroom", and "I usually browse the net searching for the answers/ explanations to a difficult topic/ subject matter", with weighted means of 4.70, 4.60, 4.60, 4.60, and 4.50 respectively, all were rated as Strongly Agree. The over-all mean was 3.80 which means "Strongly Agree".

Perceptions of Students of both Control and Experimental Groups in the Use of Multimedia in the Teaching of Science 10

The top five highest ranked items as perceived by the students of both Control and Experimental Groups in the use of multimedia in the teaching of Science 10 in Nangka National High School, Nangka, Balamban, Cebu, Philippines were: "I am very interested in social media especially facebooks, Instagram and the like", "I love to answer problem solving questions related to science especially when these are presented/explained using multimedia.", "I love to browse googles in searching for the answers to my assignments", "For me, the topic is best understood when it is presented using multimedia.", and "I find it enjoyable playing computer games or online games at home or during free time.", with weighted means of 3.50, 3.44, 3.33, 3.30., and 3.28 respectively, all were rated as Strongly Agree. The over-all mean was 3.50 which means "Strongly Agree".

IV. CONCLUSION

Based on the findings, the following conclusions were drawn:

Both the control and the experimental groups had different weighted means on every skill before the experiment was conducted.

There was a significant improvement on the science performance after the experiment on the integration of multimedia in teaching Science 10.

There was a significant improvement of the learners on the science performance after treated with traditional approach.

There was a significant improvement of the learners on the science performance after treated with experimental approach.

Both the teachers and the students strongly agreed that the use of multimedia in teaching Science 10 subject has yielded very positive results and has enabled students in the class to develop skills and active knowledge.

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