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EFFECTIVENESS OF MICROLEARNING-BASED LESSONS IN TEACHING GRADE 9 CHEMISTRY

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ABSTRACT

Microlearning-based lessons are still new in the field of education because it primarily focuses on corporate training and adult learning. Hence, limited research was conducted in basic education even in higher education. Microlearning-based lessons are designed and delivered in the form of small, bite-sized information which allows students to achieve a certain learning objective. The main purpose of this research is to determine the effectiveness of Microlearning-based Lessons in Chemistry in the level of academic performance of 18 Grade 9 students under the online learning modality. Moreover, the research instrument used was a researcher-made pretest-posttest based on the learning competencies of the Most Essential Learning Competency (MELC) consisting of 25 multiple choice items along the topics in Grade 9 Chemistry during the Second Quarter of the school year 2020-2021. Mean and paired t-tests were used as tools for analysis. Findings reveal that students' exposure to Microlearning-based Lessons in Teaching Grade 9 Chemistry improved their level of academic performance in Chemistry. This implies that students perform better when they use microlearning-based lessons in learning Chemistry. Thus, it can be concluded that the level of performance in Chemistry of Grade 9 students greatly improved after exposure to microlearning-based lessons. Furthermore, this shows the effectiveness of the intervention material in improving their level of academic performance, thus the microlearning-based lessons be adopted in teaching Chemistry is recommended.

Keywords: microlearning, online learning, academic performance, science education, junior high school

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INTRODUCTION

Chemistry focuses on chemical substances, their metabolites and applications. A major aspect of chemical research and instruction is the development of chemical concepts as well as the classification of chemical substances and processes. Access to this knowledge at each level of the student is different, requiring teachers to possess effective and fundamental teaching techniques that increase the student's capacity for learning chemistry.

According to Espinosa and colleagues (2013), students find chemistry too abstract and mathematical, which makes it challenging for those who are weak in these areas. In addition, chemistry is often regarded as a complicated and boring science because it involves a lot of terminologies. Educational tools and teaching approaches and activities positively influence students' motivation to learn chemistry (Katerina & Dionysis, 2020). To date, there are a lot of tools that make learning chemistry easier and more fun with the use of technology. It elicits students' active participation and stimulates their interest. Thus, using a wide range of instructional materials for students to visualize abstract concepts and make learning fun in the teaching and learning process is important.

Microlearning is a trend in the online education industry that is gaining growing popularity nowadays. Since it is still new in the field of education, little research and material have been developed particularly in high school. (Winograd, 2018), to explain such, shared that an emergent learning strategy called microlearning is well known for swiftly closing skill and knowledge gaps. He added that it is often referred to as "bite-sized learning" because concepts are presented in small, short, and strategic chunks. Since students are often bombarded with complex concepts in science, microlearning presents just the right amount of information to eliminate the burden of information overload and achieve their learning goal quickly. Because bite-sized lessons are more focused, learners do not have to clutter their memories with irrelevant information. Additionally, its rich media formats guarantee a better comprehension of abstract scientific ideas. This creates a virtual representation of abstract concepts and makes retention easier. When knowledge is broken down into manageable chunks through microlearning, students can access it whenever they want and spend as much time as necessary studying it at their desired pace. In addition, it offers a new paradigm for instruction that enables the delivery of knowledge and information to learners in manageable chunks. The fact that micro-content is taught in the form of brief, focused lessons make it easier to achieve more objectives. Students also find these sessions to be more enjoyable and engaging, and they are more likely to adhere to the lesson's timetable and schedule until it is finished (Jomah, 2016).

Microlearning is focused on just the right quantity of knowledge required to assist a learner in achieving a clear, specific and actionable goal. This makes microlearning-based lessons become much easier to digest and remember. When our brains are overloaded with too much information, it is more challenging to later recall the most important details when we need them. More of the information can be retained by dividing the lesson content into manageable, bite-sized chunks. Subjects might be easier to understand and retain with the help of microlearning (Mohammed, Wakil, and Nawroly, 2018). Grade 9 students tend to forget what they have learned the next day, so the teacher needs to explain the concepts again as if discussing the lessons repetitively. This can be attributed to information overload because of too many concepts presented to them.

The conceptualization of this study stems from the observation of the researcher that students perform better in Biology and Earth Science as compared to Chemistry and Physics, this may be attributed to their complexity and mathematical nature. Students find it hard when Science and Mathematics combine like topics in mole concept and percentage composition. Moreover, the researcher found out that when students are presented with too much information, it becomes difficult for them to recall important concepts that were discussed, thus some of them earned low grades for the first quarter of the school year 2020-2021. Since microlearning offers bite-sized learning and presents just the necessary

amount of information, microlearning-based lessons become much easier to digest and remember. Therefore, the researcher desires to explore and create microlearning-based lessons that could help students learn Chemistry better.

The study aimed to determine the effectiveness of Microlearning-based Lessons in improving the level of performance in Chemistry of Grade 9 students. Specifically, it seeks to determine the level of performance in Chemistry of Grade 9 students before and after the tryout of Microlearning-based Lessons in Chemistry and to determine if there is a significant difference between the pretest and posttest scores of the students.

METHODOLOGY

Research Design

This study employed one-group pretest-posttest quasi-experimental design. Participants are not randomly assigned to conditions or orders of conditions and the independent variable is manipulated (Cook & Campbell, 1979). Quasi-experimental research does not have the directionality issue because the independent variable is changed before the dependent variable is measured. Additionally, it is used to assess the effectiveness of a treatment, such as in educational intervention, or in settings where random assignment is challenging or impossible. Scores after treatment were compared to scores on the same measure in the same participants prior to treatment. Thus, it serves as a monitoring tool for the academic progress of the participants.

Population and Sample

This study was conducted at the Ilocos Norte College of Arts and Trades (INCAT) which is located at Padre Gomez Street of Barangay 5 San Pedro, Laoag City, Ilocos Norte. There are 18 participants in the study. The researcher purposively selected them since they are the only section in Grade 9 under the online learning modality for the school year 2020-2021. Moreover, the intervention requires an internet connection and is accessible only online, thus it was relevant and timely during the time of the pandemic.

Instruments

The researcher made use of teacher-made pretest-posttest consisting of 25 multiple choice items which covered specific topics in Grade 9 Chemistry for the duration of the implementation of the teaching intervention during the Second Quarter of the school year 2020-2021. To establish the reliability of the pretest-posttest , it was administered to one section of Grade 10 students who took Grade 9 Science in the previous school year. The reliability testing was conducted for two sessions, with one hour per session with three weeks intervals. Moreover, the pretest-posttest was developed following a table of specifications. It contained similar questions which covered learning competencies in Science 9 Chemistry based on the Most Essential Learning Competency. The scores of the respondents to the test items were used to assess their level of performance in Chemistry before and after the intervention was implemented. The first draft of the pretest-posttest was presented to a head teacher and two Science master teachers for content validation. Comments and suggestions were incorporated in the final draft of the pretest-posttest before administering it to the students.

Informed Consent Document were given to parents or guardians prior to the commencement of the pretest and tryout of Microlearning-based Lessons in Teaching Grade 9 Chemistry. Pretest was administered through Google form. To ensure the validity of their scores, the students were given 30 minutes to answer the 25-item multiple-choice questions while their video is turned on during the Zoom meeting. During the implementation of microlearning-based lessons. There were eight weeks intended for the Second Quarter. Each week has corresponding lessons based on the Most Essential Learning Competency (MELC). Each lesson was presented in the following manner: objectives, lesson and

assessment. After the exposure of microlearning-based lessons, a posttest was conducted the same way it was administered during the pretest.

Data Analysis

The data gathered were recorded and analyzed using mean and paired sample t-test. Paired sample t-test was used to determine the significance of any observed differences between the pretest mean scores and posttest mean scores of the participants.

In determining the level of performance in Chemistry of the students, their scores were interpreted using the following rating scale which was adopted from the Civil Service Commission Memorandum Circular No. 06, series of 2012.

Scale	Descriptive Interpretation
21-25	Outstanding (O)
16-20	Very Satisfactory (VS)
10-15	Satisfactory (S)
6-10	Unsatisfactory (U)
1-5	Poor (P)

FINDINGS AND DISCUSSION

Research Findings

Level of Academic Performance in Chemistry of Grade 9 Students Before and After the Tryout

Table 1 presents the frequency distribution of the level of performance of Grade 9 students before and after the tryout of Microlearning-based Lessons in Teaching Grade 9 Chemistry. It can be gleaned from the table that the participants' scores are within the score ranges of 6-10 and 0-5 with a descriptive interpretation of unsatisfactory and poor, respectively.

Table 1. Level of academic performance in Chemistry of Grade 9 students.

Range of Scores	Descriptive Interpretation	Pretest	Posttest
1-25	Outstanding (O)	0	5
16-20	Very Satisfactory (VS)	0	5
11-15	Satisfactory (S)	5	8
6-10	Unsatisfactory (U)	11	0
1-5	Poor (P)	2	0

The table shows that the level of performance in Chemistry of Grade 9 students before the tryout is very low, with almost all students getting scores from 6-10 which were only 24% to 40% of the items. Their level of performance in Chemistry after the tryout of Microlearning-based Lessons in Chemistry greatly improved. Better improvement was shown by their scores from 11-15, 16-20 and 21-25 which is and 44% to 60%, 64% to 80% and 84% to 100% of the items, respectively.

Comparison between the Pretest and Posttest Mean Scores of the Students

To find out if there exists a significant difference between the pretest and posttest mean scores of the students before and after the tryout of Microlearning-based Lessons in Teaching Grade 9 Chemistry, mean and one sample t-test were used.

Table 2. Test of significant difference between the pretest mean scores and posttest mean scores of the students.

	Pretest	Posttest
N	18	18
Mean	9.11	17.06
Standard Deviation	2.72	5.55
Mean Difference	7.95	
t-value	-6.39	

Critical value: 2 tailed, α=0.05, df=17) =2.110

As shown in Table 2, there is a significant difference between the pretest mean scores and the posttest mean scores as indicated by the computed value of 6.39 (absolute value), which is higher than the critical value of 2.110 at 0.05 level of significance with seventeen degrees of freedom. It can also be inferred that the posttest mean score of the student is 7.95 higher than their pretest mean scores.

DISCUSSION

It can be gleaned from the results that students' exposure to Microlearning-based Lessons in Teaching Grade 9 Chemistry improved their level of academic performance in learning Chemistry. The significant improvement in the students' level of performance in Chemistry affirms the effectiveness of the material in teaching Chemistry concepts. This supports the remarks of (Jomah, 2016) that when lessons are delivered in a short and narrow form, students are actively engaged and tend to follow the lesson schedule and time frame until the completion of it. Furthermore, the feedback from the students corroborates with what was revealed in the study of (Mohammed, Wakil, & Nawroly, 2018) that microlearning can make the learning subjects easy to understand and memorable for a longer period.

CONCLUSION

Based on the results of the pretest-posttest, there is a significant difference between the mean pretest scores and mean posttest scores of the students before and after the tryout of the Microlearning-based Lessons in Grade 9 Chemistry. Based on the findings of the study, it can be concluded that the level of performance in Chemistry of Grade 9 students greatly improved after exposure to Microlearning-based Lessons in Grade 9 Chemistry.

The developed Microlearning-based Lessons in Grade 9 Chemistry should be used by other Chemistry teachers because it was found effective and to further validate and improve the material. Researchers in science and education are encouraged to explore further the effectiveness of microlearning-based lessons in other fields of science which are taught at both the junior and senior high school levels. Future researchers may also investigate the influence of these materials on the students' participation, attitude, level of retention, level of reasoning and other variables.

REFERENCES

Cook, T., & Campbell, D. (1979). Quasi-experimentation: design and analysis issues for field settings. Houghton Mifflin, Boston.

Espinosa, A., Monterola, S., & and Punzalan, A. (2013). Career-oriented performance tasks in Chemistry: effects on students critical thinking skills. Asia-Pacific Forum on Science learning and Teaching, 1-10.

Jomah, O. e. (2016). Micro learning: A modernized education system. BRAIN. Broad Research in Artificial Intelligence and Neuroscience , 103-110.

Katerina, S., & Dionysis, K. (2020). Domain specificity of motivation: chemsitry and physics learning among undergraduate students of three academic majors. International Journal of Science Education.

Liu, Z., L., W., & Gao, X. (2016). A study on self-paced micro-course learning and implicitly layered flipped classroom. Theory and Practice in Language Studies, 870-877.

Mohammed, G., Wakil, K., & Nawroly, S. S. (2018). The effectiveness of microlearning to improve students' learning ability. International Journal of Educational Research, 32-38.

Winograd, D. (2018, May 10). eLearning Industry. Retrieved from elearningindustry.com: https://elearningindustry.com/microlearning-increases-attention-retention-ways