Scaffolding: A Keystone in Teaching Chemistry for Grade 8 Students

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Abstract:

This study answered the following questions: (1) What are the scores of students in pre-test and post-test; (2) What are the mean scores of the students in scaffolding activities and scaffolding seatwork; (3) Is there a significant difference between the pre-test and post-test mean scores; and (4) What is the level of effectiveness of scaffolding teaching approach in terms of scaffolding activities and scaffolding seatwork? The study was conducted to prove that there is a significant difference in the pre-test and post-test among the respondents. The respondents of the study were composed of three (3) sections at Sampaguita Village National High School to test the effectiveness of using Scaffolding Teaching Approach in chemistry. In this study, purposive sampling method was used in choosing the respondents. Based on the presentation and analysis of data, the following findings were obtained: (1) During the pre-test stage, the lowest score from group A was 2 and the highest score was 16 with the mean value of 9.70 and standard deviation of 3.333 with an analysis of Fair. For group B, the lowest score was 4 and the highest score was 21 with the mean value of 10.34 and standard deviation of 3.625 with an analysis of Fair. For group C, the lowest score was 3 and the highest score was 20 with the mean value of 12.16 and standard deviation of 3.962 with an analysis of Satisfactory; (2) During the post-test stage, the lowest score from group A was 16 and the highest score was 28 with the mean value of 21.54 and standard deviation of 3.048 as Very Satisfactory. For group B, the lowest score was 20 and the highest score was 28 with the mean value of 22.38 and standard deviation of 2.308 with an analysis of Very Satisfactory. Group C on the other hand, got the lowest score of 15 and the highest score of 29 with the mean of 23.13 and standard deviation of 3.927 described as Very Satisfactory. The following are conclusions derived from the data and results of the study have been presented, analyzed and interpreted: (1) The Performance Level in Pre- test of group A, B and C was considered poor before applying scaffolding teaching approach; (2) The Level of Performance Level in Post-test of group A, B, and C was described as Very Satisfactory. This means that scaffolding teaching technique helps the respondents in understanding the lessons in chemistry; (3) there was a significant difference in the pre-test and post-test results using scaffolding. After using the scaffolding teaching approach, group A, B, and C gained a greater mean score in the post-test than in the result of the pre-test. Overall, the result of the effectiveness of scaffolding teaching approach is significant in the study; and (4) During the application of Scaffolding Teaching Approach, series of activities are given to the respondents and the results shows that there is an improvement when it comes to the learning outcomes of the respondents. Hence, the Scaffolding Teaching Approach is effective.

Keywords: Pretest, Posttest, Phases of Scaffolding, Student*'s Practice, Student's Master*

1. Main Text

Introduction

The changes in the curriculum play an impact on the whole education system, especially to seasoned teachers. The Philippine education system has undergone several changes in the curriculum. Currently, the

Philippines has implemented the K to 12 programs, believing that these additional years in basic education can meet the demands of 21st - century education and become globally competitive. Before the implementation of K to 12 programs, the Philippine educational system was using the Basic Education Curriculum (BEC) in 2002 and the Secondary Education Curriculum (SEC) in 2010. The BEC 2002 centers on the progress of skills in reading and values of self-sufficiency and nationalism. It also practiced the interactive and integrative approaches that adapted competencies and values across the discipline. While the 2010 SEC, according to DepEd Order No. 76, s.2010 also known as Policy Guidelines on the Implementation of the 2010 teaching and learning that follows the Understanding by Design (UbD) framework. Furthermore, it aims to produce a learner that are ready and have an urge for work and lifelong learning (Gonzales, 2019). However, in the K to 12 Basic Education Program, teachers specifically science major experience difficulty in delivering the lesson because of their mastery level of their field of specialization. Many teachers who are biology, chemistry and physics majors are now teaching varied content areas due to the spiral progression design of the program. Because of these, the research come up to utilize scaffolding approaches in order to meet the standards of the department. In addition, with the revitalization of the science curriculum under K to 12 Program, teachers are using discovery approach which enable students to understand specific lessons by themselves with guided instructions. As Cited by Mizzi (2013) that teaching science out the specialization faces considerable challenges in lesson preparation and science teaching. They were advised to teach science during the old curriculum and force or obliged to teach the current curriculum. One of the factors considered is the students' engagement during the teaching-learning process. With discovery approach, since the students have less prior knowledge regarding the lesson, as it is designed and focus on self-discovery, the learners' loose interest along the process. Another factor considered is the participation of teachers during classes. Some students tend to disconnect because they feel teachers are not involve in the process. This is a concern of science teachers, especially that teaching chemistry since learning the subject requires practice, and student's involvement for mastery.

Problem

The primary aim of the study is to determine the relationship of scaffolding teaching approach on students' academic performance. Specifically, it sought to answer the following questions:

1. What are the mean scores of students in:
   1.1 pre-test; and
   1.2 posttest?
2. What are the mean scores of the students in the:
   2.1 scaffolding activities; and
   2.2 scaffolding seatwork?
3. Is there a significant difference between the pre-test and post-test mean scores?
4. What is the level of effectiveness of scaffolding teaching approach in terms of:
   4.1 scaffolding activities; and
   4.2 scaffolding seatwork?

Importance of the Problem

This research study is essential because it focused in scaffolding teaching approach to help elevate the interest of students in learning chemistry and its effect on their academic performance.

Review of Related Literature and Studies

According to van de Pol, et.al. (2010), the concept of scaffolding has received a great deal of attention in educational research over the past few decades. An abundance of research on scaffolding in different contexts is thus the result. Scaffolding highlights one of the key aspects of children's learning, namely that it is often "guided by others". Scaffolding is typically associated with socio-cultural theory of Vygotsky. Scaffolding metaphor explains the role of adults that play in joint problem-solving activities with

children. Borrowed from the field of construction, where a scaffold is a temporary structure erected to help the building or modification of another structure, the use of scaffolding as a metaphor within the domain of learning refers to the temporary support provided for the completion of a task that learners otherwise might not be able to complete. This support can be provided in a variety of manners that for example includes modeling and the posing of questions for different subjects at different ages.

Meanwhile, Volman, M. et.al. (2010) mention that the vast amount of rich descriptions and classifications of scaffolding strategies in different subject areas has become available in the past decades. Although no consensus exists with regard to the definition of scaffolding, contingency, fading, and transfer of responsibility are distinguished in this review as the key characteristics of scaffolding. These key characteristics deserve focus in future scaffolding analysis. An additional framework for the more precise analysis of scaffolding strategies, which can be useful for the measurement of scaffolding, is synthesized from the existing research body. A distinction between scaffolding means and intentions is made. The scaffolding of students' cognitive and metacognitive activities is studied to the greatest extend compared to the scaffolding of students' affect. The means of modeling and questioning are studied the most, mainly with a focus on students' cognitive activities. In a Spiral Curriculum, teachers must revisit the curriculum by teaching the same content in different ways depending on students' development levels. This is why certain topics are initially presented in grade school in a manner appropriate for grade schoolers, and then the same topic is tackled in high school, but on a deeper level (Lucas, M. et.al., 2013).

According to Bruner's Constructivism Theory (2017), instruction must be concerned with the experiences and contexts that make a student willing and able to learn. It must be structured to easily grasped by the students and should be designed to facilitate extrapolation.

Meanwhile, Johnston (2012) states that the spiral progression allows logical advancement from basic to multifaceted ideas. Moreover, teaching new learning in most of the students, regardless of their age or development level. Spiral Curriculum has three (3) key features based on Bruner's work, they are: (1) The students revisits a topic, theme or subject several times throughout their school career; (2) The complexity of the topic or theme increases with each revisit; and (3) New learning has a relationship with old learning and is put in context with the old information. Also Johnston stresses three (3) benefits of spiral progression: (1) The information is reinforced and solidified each time the student revisits the subject matter; (2) The spiral curriculum also allows a logical progression from simplistic ideas to complicated ideas; and (3) students are encouraged to apply the early knowledge to later course objectives.

Likewise, Ahangari et.al. (2014) reveal that, in the classroom, scaffolding is a process by which a teacher provides students with a temporary framework for learning. When scaffolding is done correctly, students are encouraged to develop their own creativity, motivation, and resourcefulness. As students gather knowledge and increase their skills on their own, fundamentals of the framework are dismantled. At the completion of the lesson, the scaffolding is removed altogether and students no longer need it. Using scaffolding was of great importance and the most effective. Its importance stemmed from being an effective means of moving students from being at risk of failure to confident, independent, and self- regulated learners.

According to van Driel et.al. (2018), Scaffolding can be used as a teaching method to stimulate language learning during content lessons. Scaffolding can be defined as "the process that enables a child or novice to solve a problem, carry out a task or achieve a goal which would be beyond his unassisted efforts". During scaffolding, a more knowledgeable other, such as a teacher or parent, provides temporal support to help a pupil to establish a learning task that he or she cannot yet establish alone. Over the course of the learning task the support gradually decreases in line with the development of the pupil until the task can be carried out independently. The method draws on the principles of the sociocultural theory that stresses the importance of social interaction for learning. According to Vygotsky, children's construction of knowledge is

the result of the internalization of external dialogue that they use when performing a learning task that is guided by a more knowledgeable adult. This guidance is necessary to help a child to proceed in the zone of proximal development (ZPD), defined as the difference between the developmental level that a child can accomplish individually and with support of an adult. Lewis (2019) asserts that the goal of scaffolding is to meet students at their ability level and guide them to grow one step at a time. This learning follows logical patterns of progression and keeps supports in place until students are able to demonstrate proficiency without them. Scaffolding should not be reserved for students with disabilities and English language learners—this practice is fundamental to all effective and equitable teaching. By layering new knowledge onto existing knowledge, students have stronger and broader foundations of understanding. Scaffolding provides more opportunities for accommodating students' individual needs along the way than more traditional teaching methods.

According to Price (2016), a substantial amount of class time is devoted to student's assessments of learning, which involves exposing students to a variety of assessment tasks. These tasks develop the students' beliefs about their performance (Dignath & Büttner, 2008) Students' perceptions of these assessment tasks in terms of difficulty, importance, interest, complexity, and value communicate certain characteristics of the classroom assessment environment, which in turn influences students' motivational beliefs and achievement. Assessments are given by teachers to students, and may even include high stakes state testing given by the state a few times a year to determine success of students and/or schools. High stakes external tests always dominate teaching and assessment; however, they give teachers a false model from which to derive their own assessments.

Likewise, according to Tomlinson (2013), nearly every modern instructional planning model, differentiation approach, and personalized learning system incorporates some form of pre-assessment. The designers of these systems clearly believe that it's essential to tap students' prior knowledge, experience, skill levels, and potential misconceptions to target instruction to individual students' learning needs. In theory, pre-assessments also may spark students' interest and provide a metacognitive foundation for self-monitoring and self-regulation by helping students connect new learning with already-acquired knowledge and understanding.

According to Jung (2015), assessing students' entry-level knowledge and skills at the start of a new unit or course also provides baseline data from which teachers can gauge improvements in learning. More formally, pre-assessment results may be used to calculate gain scores in value-added models of accountability or to monitor progress for instructional interventions. Teacher evaluation processes that include assessments of student learning objectives typically employ this type of pre- and post-test protocol. It should note, however, that this process can be corrupted, especially in high-stakes accountability contexts where gain scores are used for evaluation purposes. For example, teachers can achieve impressive gains simple by encouraging students to perform poorly on the pre-assessment. According to McTighe (2016), pre-assessments are the instruments or methods teachers use to determine students' knowledge, skills, or dispositions before instruction. Theoretically, pre-assessments help teachers determine where to begin instruction and provide teachers with baseline data from which to plot students' learning progress. Some pre-assessments are broad, addressing grade-level or course learning goals, and are administered at the beginning of an academic year or semester. Others are narrower in scope and are administered at the start of a specific unit, focusing on that unit's learning targets. Some advocates even recommend using pre-assessments at the beginning of every lesson.

Likewise, Guskey, T. et.al. (2018), conclude that teachers can design pre-assessments to measure any type of learning goal: cognitive, affective, or behavioral. Cognitive pre-assessments address academic goals and focus on what students know and can do. For instance, a teacher may ask what students remember from a previous lesson or pose an initial question such as, "Why is it warm in summer and cold in winter?" Cognitive pre-assessments are the most common form used in classrooms today. Pre- test enables the teachers to use if

what is to be covered in the lesson or unit is already mastered. If all of the students have a topic or unit is already mastered. If all the students have a topic or skill mastered then a teacher can skip a lesson. If only a couple of students have a problem, then the teacher can give them individualized instruction to bring them up to speed. If the majority of the students are struggling with the information then the teacher can continue with their lesson. This will give a quick and informal way to check for understanding before starting the lesson. Pre- test gives a preview of what will be expected. Setting clear expectations helps students begin to focus on the key topics that will be covered throughout the lesson. This also gives an opportunity to set educational goals for the coming weeks (Wagner, 2015).

Meanwhile, testing materials before they are used in live examination that allows to make a certain exam accurate, fair and reliable. Pre- testing is important to ensure that these were no questions likely to test anything but the student's language ability. The data produced by pre- testing is then analyzed in details so that exam papers are constructed with the assurance that they are equivalent in difficulty and content to their processors (Derick, 2018).

According to Hale (2018), it is very important to have a pre- test for questionnaire. The main concern of pre- test is to have a reliable question format and also a good wording and other. By establishing a correct pre- test, the questionnaire will yield better results. The differences in the performance of the students is noted through the result of the post- test. There is always a tendency that the performance improved in the post- test. Post- test is used to measure how much students have improved in one semester of the study; the pre/ post-test by using designed to cover all of the topics which students will be studying during a semester. A test called post- test should be designed to measure the amount of learning a student has acquired in a specific subject and demonstrate that the student has acquired skills in specific subject. To demonstrate the students' progress has been made during a given semester, the post- test score should be higher comparing to the pre-test score (Kuehn, 2019). Kuehn (2019), also mentions that pre/post-test functions as a teacher diagnostic tool in the following five ways: (1) It Identifies the Very Weak Students in a Class; (2) It Identifies the strongest students in a class; (3) It identifies topics which the students already know; (4) It identifies topics which the students don't know; and (5) It identifies topics which the students have not learned. According to McLeod (2016), children observe the people around them behaving in various ways. This is illustrated during the famous Bobo doll experiment. Individuals that are observed are called models. In society, children are surrounded by many influential models, such as parents within the family, characters on children's TV, friends within their peer group and teachers at school. These models provide examples of behavior to observe and imitate, e.g., masculine and feminine, pro and anti-social. Children pay attention to some of these people (models) and encode their behavior. At a later time, they may imitate (i.e., copy) the behavior they have observed. They may do this regardless of whether the behavior is 'gender appropriate' or not, but there are a number of processes that make it more likely that a child will reproduce the behavior that its society deems appropriate for its gender.

Also, Koedinger, et.al. (2012) says that the function of a knowledge model is to infer how well a student knows each skill in the learning content, by looking at the pattern of correct and incorrect responses that a student gives. Models adopting this approach have been found to have good accuracy and reliability in modeling student knowledge in a range of applications, including in open and distance learning contexts (Sao Pedro, et. al., 2013).

Khajah et. al. (2014) cite that although some models have attempted to infer how long a student will retain factual content, toward optimizing the spacing of practice, these models do not provide guidance regarding how close a student is to reaching mastery. In particular, both instructors and adaptive systems may find it useful to know when a student is ready to move to a different concept or lesson and whether the student potentially needs additional scaffolding and tutoring. This may be particularly relevant in distance education

contexts, where much of the information available to instructors in person is no longer available or where learners require additional learning supports and measures of their own competencies.

It was stated by Zacharia (2012) that modeling-based Learning (MbL) is an approach for teaching and learning in science whereby learning takes place via student construction of models as representations of physical phenomena that include representations of physical objects and their characteristics, physical entities and physical processes involved in the physical phenomena. This leads to an externalized representation of the underlying mechanism of a physical phenomenon and helps learners build an understanding of that mechanism. The value and great potential of MbL in enhancing science teaching and learning has been highlighted by many researchers. The accumulation of research studies on modeling-based teaching and learning has created the need to organize this knowledge across its different aspects (cognitive, metacognitive, social, material, and epistemological), as well as to provide an overview of what needs to be investigated further. The ultimate goal of this organization would be to develop a coherent framework that portrays how MbL could be effectively integrated in science teaching and learning.

Meanwhile, Pluta, et.al. (2011), states that external representations of abstract ideas (e.g., velocity) that are easy to apply, read and/or use even when they are expressed in, for example, mathematical language. This definition of models does not include mental models, which are students' internal representations of ideas, concepts, etc. Models constructed through modeling have an important role in scientific research, both for formulating hypotheses to be tested as well as for describing scientific phenomena.

According to Thistoll, et. al. (2016) shows that support and monitoring of student learning, as well as the promotion of motivation and engagement in the learning process, are important success factors in whether students complete distance education courses. The ability to forecast a student's future performance and knowledge in a learning activity affords the ability for the system, or for an instructor, to act upon that information and ensure that distance education learners are receiving adequate support and scaffolding in their studies. Additionally, it gives learners agency over their learning process and the ability to see their learning trajectories.

Damyanov, et.al (2018) mentions that Contemporary culture is a visual culture. Visual images become the predominant form of communication. Students should be visually literate and be able to read and use visual language, to decode, interpret and evaluate visual messages successfully, and, last but not least, to encode and compose meaningful visual communication. The combination of modeling with other methods in scientific knowledge increases its potential as a cognitive method. Infographics can play a significant role in the process as tool or target according to the age and cognitive abilities of the students. Information images (infographics) are visual representations of information, data or knowledge. Relatively, the use of infographics as a modeling method can develop different cognitive skills such as interpretation, analysis, assessment, conclusion, explanation, which are all part of the modeling process. In fact, they can be a tool for achieving the next stage of literacy - visual literacy. All this necessitates the exploration of infographics as an instrument in the development of a comprehensive system of cognitive tasks in education related to the formation of skills for modeling which were found by the researcher to have relevance to the present study.

Meyer (2010) reveals that the concept of 'independent learning' is associated with, or part of, a number of other educational concepts and wider policy agenda of contemporary relevance such as 'personalization', 'child- or student-centered learning' and 'ownership' of learning. It is a feature of important issues such as pupil–teacher roles and relationships and the role of information and communications technology (ICT) in learning. Theoretical study and practical application of the principles of independent learning are perhaps most advanced in the U.S., but the concept is of increasing significance in the UK. It is one of the essential elements of 'personalized learning', and has been seen as vital to the continuing development of a system of school education that promotes high quality and lifelong learning and social equity and cohesion.

Methodology

The quasi- experimental design was used to determine the effect of scaffolding approach on grade 8 students' academic performance in chemistry from three (3) sections selected to the respondents in this study. Quasi-experimental Design was used because no randomization happened upon the formation of sections as participants of the study. Since the students have been grouped already by section before the start of experimentation, thus, cannot be regrouped. One hundred sixty (160) grade 8 students were used as respondents in this research. Composed of three (3) sections that was already grouped/ sectioned before the study was made. Fifty- seven (57) came from Grade 8- Section A, Forty- seven (47) came from Grade 8- Section B and Fifty- six (56) came from Grade 8- Section C within Sampaguita Village National High School which categorized as one of the big school in the District of San Pedro, Schools Division of Laguna. The research instrument underwent two (2) types of validation, the face validation and the content validation. For face validation of research instrument, a research-made questionnaire was submitted to a Science Teacher critic who checked the overall format of the test questions to make sure that it would earn good impressions from the respondents and that it would not be confusing to the respondents that may lose their interest in answering seriously the test questions.

Results and Discussion

The data gathered on the given pre-test and post-test to find out whether significant differences exists between the scores of the pre-test and post-test after using the scaffolding teaching approach.

Table 1. Level of Students' Performance in terms of Pre-test

Group	Lowest Score	Highest Score	Mean	Standard Deviation	Verbal Interpretation
A	2	16	9.70	3.333	Fair
B	4	21	10.34	3.625	Fair
C	3	20	12.16	3.962	Satisfactory

Legend:

24- 29.99	Outstanding
18-23.99	Very Satisfactory
12-17.99	Satisfactory
6-11.99	Fair
0-5.99	Needs Improvement

Table 1 showed the scores of group A, B, and C of the respondents during pre-test. Group A got the lowest score of 2 and the highest score of 16 with a mean 9.70 and standard deviation of 3.333 with a remark of Fair. Group B got the lowest score of 4 and the highest score of 21 with a mean 10.34 and standard deviation of 3.625 with a remark of Fair. Group C got the lowest score of 3 and the highest score of 20 with a mean 12.16 and standard deviation of 3.962 with a remark of Satisfactory. This implies that the respondents have low level of mastery about the lesson in chemistry. One factor why the respondents got a low level of mastery in chemistry because the respondents do not have the idea about the lesson and also the given lessons are not yet discussed by the subject teacher. And based on the result of the pre-test, the research identified the different learning competencies to develop.

Table 2. Level of Students' Performance in terms of Post-test

Group	Lowest Score	Highest Score	Mean	Standard Deviation	Verbal Interpretation
A	16	28	21.54	3.048	Very Satisfactory
B	20	28	22.38	2.308	Very Satisfactory
C	15	29	23.13	3.927	Very Satisfactory

Legend:

24- 29.99	Outstanding
18-23.99	Very Satisfactory
12-17.99	Satisfactory
6-11.99	Fair
0-5.99	Needs Improvement

Table 2 showed the scores of group A, B, and C of the respondents' post- test. Group A got the lowest score of 16 and the highest score of 28 with a mean 21.54 and standard deviation of 3.048 with a remark of Very Satisfactory. Group B got the lowest score of 20 and the highest score of 28 with a mean 22.38 and standard deviation of 2.308 with a remark of Very Satisfactory. Group C got the lowest score of 15 and the highest score of 29 with a mean 23.13 and standard deviation of 3.927 with a remark of Very Satisfactory. This indicates that the scaffolding teaching approach helps to improve the learning ability of the respondents in mastering specific lesson in chemistry.

It can also be seen in Table 2 that the remarks of Group A, B, and C from the given post-test. Group A got a remark of Very Satisfactory while during pre-test the remark was Fair, while Group B got a remark of Very Satisfactory from Fair during pre-test and Group C got a remark of Very Satisfactory from Satisfactory during pre-test. This indicates that Scaffolding Teaching Approach helps the respondents in understanding and analyzing the given questions during pre-test and post-test.

Table 3. Difference between the Pre-test and Post-test using Scaffolding Teaching Approach

Group	Mean		Mean Difference	t-value	p-value	Verbal Interpretation
	Pre-test	Post-test				
A	9.70	21.54	11.84	-19.034	0.000	Significant
B	10.34	22.38	12.04	-21.764	0.000	Significant
C	12.16	23.13	10.97	-14.303	0.000	Significant

Table 3 showed the comparison on differences of the pre-test and post-test result of the respondents from group A, B, and C using paired t-test. There was a significant difference in the performance of the students in Group A. This was supported by mean difference of 11.84 and a t-value of -19.304 at 0.000 level of significance. For group B, there was a significant difference in the performance of the students. This was supported by mean difference of 12.04 and a t-value of -21.764 at 0.000 level of significance. And for group C, there was a significant difference in the performance of students. This was supported by mean difference of 10.97 and a t-value of -14.303 at 0.000 level of significance. This implied that using Scaffolding Teaching Approach affect the students' performance during the pre-test and post-test. Similarly, the study of Malik (2019) that evaluation in teaching is an integral part of successful and effective teaching. It is defined as "the process of obtaining information about a course or a program of teaching for subsequent judgment and

decision-making". Pre-test/post-test and post-test-only designs are important assessment tools that help in direct and effective evaluation of a course or lecture to improve student learning. The idea of pre-test/post-test evaluation model is to measure baseline knowledge of participants at the beginning of a course/lecture and compare it with the knowledge gained after the course. Comparing participants' post-test scores to their pre-test scores enables to see whether the activity was successful in increasing participants' knowledge of the taught content. In the post-test only model, the design is the same as pre-test/post-test but the pre-test is omitted.

Table 4. The Level Effectiveness of Scaffolding Teaching Approach

Variables	beta	t-value	p-value	Verbal Interpretation
Activities	0.128	2.534	0.012	Significant
Seatwork	-0.164	-1.204	0.230	Not Significant

Table 4 showed the effectiveness of Scaffolding Teaching Approach based on the respondents' performances in given activities. The beta coefficient of 0.128 indicates that the scaffolding approach was effective in enhancing students' performance during the activities. The t-value of 2.534 was significant at 0.012. The adjusted R-value indicates that 3.12% of the variation in the students' performance during the activities was influenced by the scaffolding approach. The F-value of 3.564 is significant at 0.0301 probability level. It means that the academic performance of the students in post-test was contributed more by the scaffolding activities than in seatwork. These activities help a lot the students to practice the concepts they have learned than having a paper-pencil test. It implies that there is an improvement in the learning outcomes of the respondents when it comes to activities using the Scaffolding Teaching Approach while in seatwork. Moreover, seatwork remarks show no significance because the researcher was focused more on giving activities rather than giving a formative test such as seatwork. As supported by Ahangari et.al. (2014) that in the classroom, scaffolding is a process by which a teacher provides students temporary framework for learning. When scaffolding is done correctly, students are encouraged to develop their own creativity, motivation, and resourcefulness. Also, Lewis (2019) notes that the goal of scaffolding is to meet students at their ability level and guide them to grow one step at a time. This learning follows logical patterns of progression and keeps supports in place until students are able to demonstrate proficiency without them. Scaffolding should not be reserved for students with disabilities and English language learners—this practice is fundamental to all effective and equitable teaching. By layering new knowledge onto existing knowledge, students have stronger and broader foundations of understanding. Scaffolding provides more opportunities for accommodating students' individual needs along the way than more traditional teaching methods.

Conclusion and Recommendation

The following are conclusions derived from the data and results of the study have been presented, analyzed and interpreted: (1) The Performance Level in Pre- test of group A, B and C was considered poor before applying scaffolding teaching approach; (2) The Level of Performance Level in Post-test of group A, B, and C was described as Very Satisfactory. This means that scaffolding teaching technique helps the respondents in understanding the lessons in chemistry; (3) there was a significant difference in the pre-test and post-test results using scaffolding. After using the scaffolding teaching approach, group A, B, and C gained a greater mean score in the post-test than in the result of the pre-test. Over all the result of the effectiveness of scaffolding teaching approach is significant in the study; and (4) During the application of Scaffolding Teaching Approach, series of activities are given to the respondents and the results shows that there is an improvement when it comes to the learning outcomes of the respondents. Hence, the Scaffolding Teaching Approach is effective. It is recommended that: (1) For students' better academic performance, scaffolding teaching

approach is recommended to use frequently in teaching Science 8 specifically, the area of chemistry. Based on the results, while teachers are guiding the students through scaffolding teaching approach, the result of their learning outcomes become greater than the usual; (2) Teachers may adopt different teaching approaches such as scaffolding teaching approach, modelling, conceptual mapping, cooperative learning approach through peer teaching, games, pre- discussion approach, simulation, and among others; (3) School Administrators may utilize scaffolding teaching approach by providing sufficient teaching and learning materials such as production of worksheets that are suitable for each type of learners; (4) School Administrators may conduct seminars to assists teachers on the different trends in teaching to keep them abreast in teaching methodologies for an improved delivery of instruction among learners; and (5) Future research on teaching methodologies and approaches can be conducted for further investigation of other issues and concerns that may be added to the findings of this study.

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