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Biology Learning Station Strategy (BLISS): Its Effects on Science Achievement and Attitude towards Biology

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Abstract: Science education faces monumental changes in terms of curriculum design and approach brought about by the challenges of globalization and diversifying educational landscapes. This study sought to test the effects of Biology Learning Station Strategy (BLISS) to the academic achievement and attitude of junior high school Science students. This action research utilized a within-group pretest-posttest experimental design involving 28 Grade 10 Science students of a government-run secondary school in Central Luzon, Philippines. The study found out that prior to the intervention, the junior high school Science students were performing below average in terms of Science achievement and have slightly positive attitude towards Biology. After the intervention, the students' Science achievement and their attitude towards Biology had improved. BLISS was found to be an effective differentiated learning strategy in improving the Science achievement and attitude towards Biology of students. There was a positive relationship between Science achievement and attitude towards Biology.

Keywords: Science education, Biology learning station strategy, Science achievement, Attitude towards biology, Differentiated learning strategy

Introduction

Science education faces monumental change in terms of curriculum design and approach. As the Philippine Education transformed its new curriculum into K+12 Enhanced Basic Education, many changes have been transpiring in terms of student outcomes, instructional design and educational policies. The 21st century learning society demands more innovative and more creative teaching strategies that would enhance learning, motivate learners and facilitate better education for the students of this generation. Science is one of the least mastered subjects among Filipinos as revealed by TIMSS (2006) and low National Achievement Test (NAT) being administered by DepEd. The low performance of Science students can be attributed to large class size, limited facilities as well as limited hands-on activities (Natividad, et.al., 2015). Moreover, low performance in the subject is due to inappropriate learning plan and teaching strategy used by teachers.

Hence, to overcome such dilemma, the researcher used the Biology Learning Station Strategy (BLiSS) to improve Science students' academic achievement and attitudes. BLiSS is a differentiated instruction approach. Teachers can differentiate content, process, and/or product for students (Tomlinson, 1999). Differentiation of content refers to a change in the material being learned by a student. For example, if the classroom objective is for all students to identify parts of a cell, some students may learn to label five major parts, while others may learn to label more parts and define the function of each part. Differentiation of process refers to the way in which a student accesses material. One student may explore a learning center, while another student collects information from the web (US Office of Special Education Program, 2016).

BLISS is an approach caters all students in the group providing them equal opportunities as self-directed learners and independent cooperative learners by performing varied science learning activities assigned to them. The presentation and critiquing of outputs will follow after the students finished their respective learning station activities. The teacher will act only as facilitator and synthesizer of concepts. In addition, the learning station allows students to use the learners' materials. This situation can motivate them to participate actively in the teaching and learning process. Through it, their self-confidence can be increased, and they will grow to be brave and courageous in facing any challenges and in the future, will be of benefit to community and country (Yasin, et.al, 2014). Learning in stations is a student-centered method that teaches bringing forward what previous group did by whole class's contributing to each stage-station (Gözütok , 2007). In the education world, the constructivist paradigm promotes hands-on learning and student-centred classrooms in which pupils construct their own knowledge. Reiser and Butzin (2000) observed that "active learning is supported by the extensive use of station activities" in contrast to the traditional whole-class instruction during which students sit passively

while the teacher is active. The present study explored the effectiveness of Biology Learning Station Strategy in improving academic performance and attitude in Science. It was applied in a heterogeneous class wherein learning stations are formed to contribute in the improvement of the achievement and attitude if students.

Learning Station Approach

In the study of Yasin, et.al. (2014) entitled, "Learning Station Method in Special Education Programs for Students with Learning Disabilities," they determine the effectiveness of the Learning Station Method (LSM) in the Special Education Programme for students with learning disabilities. LSM is a teaching and learning method equipped with effective teaching materials that emphasize 'hands-on experience' and learning through play. This method is an alternative method to the traditional teaching and learning method that is currently being implemented in Special Education Programmes in Malaysia as it provides students with opportunities for experiential learning and is also conducted according to students' individual ability and interests. Research findings showed that LSM was successful in increasing students' interest, mastery of skills taught and positive behaviour.

The Learning Stations Method is implemented as an alternative teaching method for special needs children based on their capacity and interest. This method provides a more flexible teaching and learning approach that is focused and relevant to the ability of special needs students. The implementation of a special education curriculum enables teachers to modify the methods or techniques of teaching and learning, teaching time and teaching aids to achieve the aims and goals of special education. Through a flexible and integrated process of teaching and learning, it is expected that special education teachers would be able to produce independent, disciplined, productive special needs individuals who display a positive attitude and can contribute to their family, community and country.

In the study of Breckler & Amman (2011), they devised a new instructional strategy to enhance kinesthetic learning of basic science which is the Basic Science Learning Station. At the Learning Station, students experience weekly self-guided activities which include the physical manipulation of games, puzzles and conceptual models. The Learning Station modules provide opportunities for students to integrate basic science information, reinforce concepts presented in other formats (i.e. lecture or case-based), and provide motivation and enthusiasm for basic science learning. Furthermore, the Learning Station kinesthetic strategy provides a new curricular structure in which basic science faculty can design ways to help students integrate clinical and basic science content domains. The students reported they enjoyed the hands-on approach to learning.

Learning stations also allow the teacher to become a coach and facilitator, as the constructivist paradigm suggests a guide rather than a focal point, the teacher can circulate among the stations, working with individual students and groups in order to support, question, encourage, and motivate the learners as they work (Fox, 2004). Milner and Milner (2003) believe that learning stations provide students with an opportunity to work with greater autonomy. They also help teachers man-age scarce materials and resources and promote independence as the students are able to choose the subject, approach and pace.

Differentiated Instruction

Carol Ann Tomlinson, a leader in the field of differentiated instruction, and her colleagues define differentiation as "an approach to teaching in which teachers proactively modify curriculum, teaching methods, resources, learning activities, and student products to address the needs of individual students and small groups of students to maximize the learning opportunity for each student in the classroom" (Tomlinson, et.al., 2003). Rather than designing a lesson for all and then retrofitting for a few, a differentiated approach requires planning for a range of grouping experiences, materials, and methods for receiving information and demonstrating mastery.

When differentiation becomes the norm for all, rather than a stopgap measure for individual students, all learners benefit because of instruction intent on building background knowledge, using flexible grouping arrangements, and teaching for knowledge and strategies (Marzano, Pickering, & Pollock, 2001). Differentiated instruction, also called differentiation, is a process through which teachers enhance learning by matching student characteristics to instruction and assessment. Differentiated instruction allows all students to access the same classroom curriculum by providing entry points, learning tasks, and outcomes that are tailored to students' needs (Hall, Strangman, & Meyer, 2003).

Attitude towards Biology

A student's attitude toward a particular discipline may affect his or her motivation to excel (Osborne et al. 2003). In order to facilitate learning, it is therefore important that educators familiarize themselves with students' attitudes and associated behavior (e.g. effort, reasoning and problem solving skills) as well as the factors that may influence students' attitudes. Student attitudes toward science have been investigated since the mid 1960s (Munby 1981; Ramsden 1998; Osborne et al. 2003; Reid 2006), when educators started seeing a decrease in enrolment in science courses and decreased interest in science and technology related disciplines among youth. As the association between attitudes and learning recently has become more clear new instruments and methods to measure the impact of courses on students' attitudes have been developed (Baldwin measure the impact of courses on students attitudes have been developed (Baldwin et al. 1999; Coll et al. 2002; Quinnell et al, 2005; Adams et al. 2006; Barbera et al. 2008).

Science Achievement

According to Sadowski (1998), students who are said to have low academic achievement usually features a low, low social control impulsive actions, poor problem-solving skills, low self-esteem, difficulty in accepting individual differences and communication skills that are weak compared to individuals who have a high level of emotional intelligence. Many people assume that if an individual has a high level of intelligence, then the individual will have the opportunity to achieve better success than others. However, there are many cases where a person has a high level of intellectual are isolated from colleagues who have lower IQ (Razak, 2015). Azizi (2007) stated that the EQ is more important than IQ for academic success, as necessitated by the world of education, is not a guarantor or a certificate to be successful in life. This proves that high intelligence does not guarantee a person will achieve success in their life if they cannot control their own emotions.

Conceptual Framework

This study was based on the well-known theory of learning which is Jean Piaget's constructivist theory of. As Slavin (2006) asserts, one of the most important principles of educational psychology is that teachers cannot simply give knowledge to students. He continues that learners must construct knowledge in their own minds and teachers are just as facilitators. This theory perceives learners to be cooperative and the class to be student-centred. As cited in Ocak (2008), the constructivist approach encourages students to confront real world problems which are within their everyday experience and presents students with opportunities to construct new knowledge based on their prior knowledge (Fosnot, 1996; von Glasersfeld, 1991; Zhao, 2003; Yager, 1991).

Constructivism is an important theory of learning that is used to guide the development of new teaching methods in education. The constructivist approach encourages students to confront real world problems which are within their everyday experience and presents students with opportuni-ties to construct new knowledge based on their prior knowledge (Fosnot,1996; von Glasersfeld, 1991; Zhao,2003; Yager, 1991). The conceptual framework shows the Biology Learning Station Strategy as an intervention in improving academic achievement and attitude among Science students.

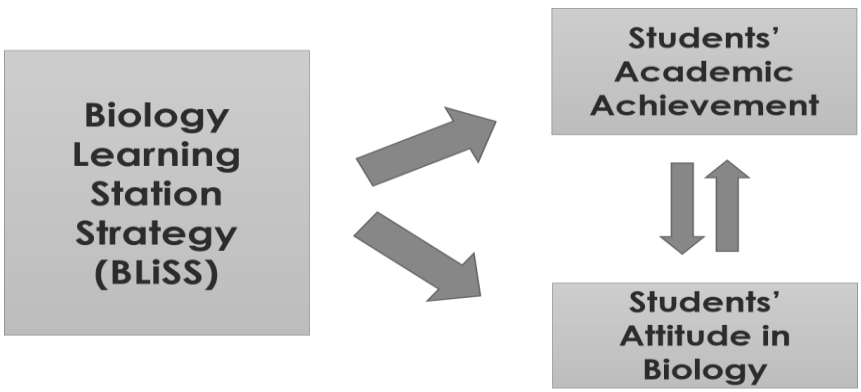

Figure 1. The Research Paradigm

Figure 1 shows the use of Biology Learning Station Strategy, based on the Constructivist theory of Jean Piaget, as the intervention of the study. It aims to improve the academic achievement of the students as well their attitudes towards Biology. The data came from the results of pre-test/post-test, quizzes, laboratory activities, and Biology attitude test. The results were interpreted using different statistical tools. These include item analysis, mean frequency, standard deviation, frequency and percentage distribution, weighted average, t-test and Pearson R correlation. After the processing of data, it is expected that the intervention will improve the academic achievement and attitude of the students.

Statement of the Problem

This study aimed to test the effect of Biology Learning Station Strategy (BLISS) to the academic achievement and attitude of Science 10 Science students of a state-run secondary school in Central Luzon, Philippines.

Specifically, it answered the following questions:

1. What level of academic achievement and attitude do the Grade 10 students have prior to the study?
2. What level of academic achievement and attitude do the Grade 10 students have after the application of BLiSS?
3. Is there a significant difference on the academic achievement and attitude of the students after the application of the said strategy?
4. Is there a significant relationship between academic achievement and attitude of the Science students?

Method

Research Design

This action research utilized a within-group pretest-posttest experimental design. An action research covers a broad array of research strategies that are dedicated to the integrated production of knowledge and the implementation of change (Prudente & Aguja, 2015). Action research designs are systematic procedures done by teachers (or other individuals in an educational setting) to gather information about, and subsequently improve, the ways their particular educational setting operates, their teaching, and their student learning (Mills, 2011). In any given experiment, the number of participants may be limited and it may not be possible to involve more than one group. In these cases, researchers study a single group using a within-group experimental design (Creswell, 2012).

Research Setting and Participants

This study was conducted in a state-run secondary school in Central Luzon, Philippines in 6 weeks. The study involved a total of 28 Grade 10 Science students comprising of 10 boys and 18 girls. The study used the purposive sampling technique which involved deliberate selection of people considered to be the most appropriate source of data in line with the objectives of the study.

Research Instruments

Teaching Plan

The teaching plan was composed of the teaching units and objectives which was obtained from the prescribed lessons given by the Department of Education (DepEd) under the K + 12 Enhanced Basic Education Curriculum. It also included the teaching strategies, instructional materials and the evaluation used. The teaching unit had the topics and subtopics covered for the particular quarter in Science. The study covered the lessons in Third quarter about Living Things and Their Environment (Grade 10 Biology Part). The study comprised three modules which include Module 2 (Heredity: Inheritance and Variation), Module 3 (Biodiversity and Evolution), and Module 4 (Ecosystem: Biodiversity).

Biology Test (Pretest/ Posttest)

In order to gather a reliable and valid data to determine the effectiveness of the BLISS among the students of Grade 10 in Science subject, the researcher used a diagnostic test / achievement test. To fully improve the students' Science achievement and attitude, they were also evaluated based from their quizzes, laboratory activities and performance tasks. The pretest/post-test used was composed of 50 items based from the topics covered for the Third Quarter. It was based from the DepEd's Science Learners' module. The knowledge, comprehension, application and higher-order thinking skills (HOTS) were measured in the test. The Biology Test was subjected to content validity by three expert validators. The test questionnaire was pre-administered to 20 BSED I students who have taken already topics on Genetics, Evolution and Biodiversity during their high school. Item analysis was done to assess the exam's reliability.

Biology Attitude Scale (BAS)

The Biology Attitude Scale measured the attitude of the students towards Biology. It measured the perceptions of the students towards the subject, the usefulness of the subject and the interest of the learners. The following rating scales were devised to interpret the responses in the BAS. The Biology Attitude Scale used is a standardized and validated questionnaire authored by Russell & Hollander (1975).

Data Gathering Procedure

In order to answer the research problems, the following procedure was undertaken by the researcher:
Phase 1. Validation of the Biology Test Questionnaire by three content experts.
Phase 2. Approval of the school head to conduct the study and asking for consent of the parents.
Phase 3. Administration of Pre-test. The level of proficiency of the participants in terms of Science achievement and attitude was determined prior to the application of the intervention. The researcher made use of a 50-item diagnostic test and the Biology Attitude scale.
Phase 4. Application of the Strategy. The Biology Learning Station Strategy (BLISS) is applied thrice a week in the teaching-learning process. Quizzes, laboratory activities and performance tasks were given to students to see students' improvement. The BLISS is a differentiated instruction approach. It covered the entire teaching-learning process. The steps in infusing the strategy were as follows:

a) Be motivated. Motivate the learners through various media.
b) Learning time. The topic will be revealed by the teacher and will assign the activities to the different learning stations for them to do. Each learning station has its different activity to do.
c) Impart and critique. Learning stations will present their outputs and will be critiqued by the teacher.
d) Synthesis and deepening. The teacher and/or students will synthesize and summarize the learning of the day. The teacher will correct some misconceptions committed in the presentation.
e) Set the gauge. Evaluate the learning outcomes of the students.

Phase 5. Administration of Post-test. The Biology post-test and Attitude Scale was again administered to the students. The researcher made use of a 50-item diagnostic test and the Biology Attitude scale.

Data Analysis

Data were analyzed using descriptive statistics like frequency counts, percent, mean, standard deviation, and t-test for dependent samples. Pearson-r correlation was also used. The researcher came up with the following rating scale for the diagnostic/ achievement test:

Table 1. Descriptive Rating for the Biology Diagnostic/ Achievement Test

Class Interval	Descriptive Rating
41-50	Outstanding
31-40	Very Satisfactory
21-30	Satisfactory
11-20	Fairly Satisfactory
1-10	Did Not Meet Expectations

The researcher used the following rating scale for the attitude inventory.

Table 2. Descriptive Rating for the Biology Attitude Scale

Range	Descriptive Rating	
4.20-5.00	Strongly Agree	Very Positive
3.40-4.19	Agree	Positive
2.60-3.39	Slightly Agree	Slightly Positive
1.80-2.59	Disagree	Negative
1.00-1.79	Strongly Disagree	Very Negative

Results and Discussion

Level of Science Achievement and Attitude of Students before the Application of the Biology Learning Station Strategy (BLISS)

The results of the pre-test determined the level of Science achievement of the students prior to the infusion of the application of the Biology learning Station Strategy (Table 3).

Table 3. Frequency Distribution of Students' Scores in Pre-Test

Class Interval	Frequency	Percentage	Descriptive Rating
41-50	0	0.00	Outstanding
31-40	1	3.57	Very Satisfactory
21-30	5	17.86	Satisfactory
11-20	22	78.57	Fairly Satisfactory
1-10	0	0.00	Did Not Meet Expectations
Overall	**28**	**100.00**	Mean = **18.29** **(Fairly Satisfactory)**

The results of the pre-test showed that only 3.57% of the class belonged to the very satisfactory level, most of the students belonged to the fairly satisfactory level (78.57%). None of the students belonged to the outstanding and did not meet expectations level. Before the use of the strategy, the level of Science achievement of the class is considered Fairly Satisfactory as revealed by the weighted mean of 18.29. The students were below average in terms of Science achievement before the application of the strategy. As cited by Demir, et. al. (2011), station model is prepared for bringing in structural and conceptual thought, difficult subjects and high level skills and in this context compulsory or selectable stations are formed in station technique.

Table 4 shows the level of students' proficiency in the pre-test across learning domains. The percentage of the students classified according to the level of performance of the class was 37.93% in Application, 34.48% in Knowledge and Comprehension, and 24.14% in Higher Order Thinking Skills (HOTS).

Table 4. Students' Proficiency Level in Pre-test across Domains

Domain	Average Number of Students *(n=28)*	Percent (%)
Knowledge	10	34.48
Comprehension	10	24.48
Application	11	37.93
HOTS	7	24.14
Overall	**10**	**34.48**

Furthermore, the result of the diagnostic test showed that only 10 (34.48%) students performed well in all of the four domains of students of Science achievement. According to Demir, et. al. (2011), one of the most beneficial features of learning stations is that it offers groups based on students with distinct ability levels, needs and learning styles. Each student in the group is provided with opportunity to interact with other students and to share equipment, knowledge and skills.

The attitude of the students towards Biology was also determined before the intervention. Their Biology Attitude Scale measured the students' attitude towards the importance of Biology, the application of Biology in

real life and the perspectives of students towards the subject. The students' attitude towards Biology is presented in Table 5.

Table 5. Students' Attitude towards Biology before the Intervention

Statement	Weighted Mean	Verbal Description	Rank
1. I like biology more than other subjects.	3.57	Agree	2.5
2. Nature and biology is strange for me.	2.86	Slightly Agree	12
3. Biology lessons are very difficult for me.	3.07	Slightly Agree	11
4. Biology helps in the development of my conceptual skills.	3.79	Agree	1
5. I would like to have biology lessons more often.	3.50	Agree	7.5
6. Biology knowledge is essential for understanding other courses and phenomena.	3.57	Agree	2.5
7. During biology lessons, I am bored.	2.63	Slightly Agree	14
8. The progress of biology improves the quality of our lives.	3.36	Slightly Agree	10
9. Biology is our hope for solving many environmental problems.	3.54	Agree	5
10. Biology is not important in comparison with other courses.	2.39	Disagree	16
11. I make many efforts to understand biology.	3.50	Agree	7.5
12. Biology is important part of our lives.	3.39	Slightly Agree	9
13. Nobody needs biology knowledge.	2.18	Disagree	17
14. I hate biology lessons.	2.43	Disagree	15
15. I find biological processes very interesting.	3.54	Agree	5
16. The work with living organisms in biology lessons is very interesting.	3.54	Agree	5
17. Biology is one of the easiest subjects for me.	2.71	Slightly Agree	13
Overall Mean	**3.37**	**Slightly Positive**	

As gleaned from the table, the students had slightly positive (3.37) attitude towards Biology. Majority of the students agreed that Biology helps in the development of their conceptual skills (3.79). Likewise, they liked Biology more than other subjects (3.57) and agreed that Biology knowledge is essential for understanding other courses and phenomena (3.57). Meanwhile, they disagreed that Biology is not important in comparison with other courses (2.39). Also, they disagreed that nobody needs biology knowledge (2.18). According to Gercek (2010), learning stations have basic characteristics such as shared responsibility among group members, learning the interpersonal communication, shared leadership, feedback provided by teachers and students' evaluation of group effectiveness.

Level of Science Achievement during the Application of the Biology Learning Station Strategy (BLISS)

To further determine the improvement in the Science achievement of students, the researcher also recorded the results of selected quizzes, laboratory activities and performance tasks. Table 6 shows the summary of students' scores in quizzes.

Table 6. Students' Scores in Quizzes

Quiz	Mean	*sd*	*% of Performance*
A. Getting to know the DNA and RNA structure (10 items)	7.29	1.22	72.86
B. Mutation: Changes in the Genetic Code (5 items)	3.71	0.96	74.29
C. Sources of Evidence for Evolution (10 items)	8.57	1.78	85.71
D. Theories of Evolution (10 items)	8.64	1.42	86.43
E. Ecosystem and Biodiversity (10 items)	10.00	0.00	100.00

The results of the students' individual quiz scores increased during the application of the strategy as revealed by the percentage of performance. The calculated standard deviations also showed homogeneity of the class. The class registered a 72.86% performance in Quiz A (Getting to know the DNA and RNA structure), 74.29% in Quiz B (Mutation: Changes in the Genetic Code), 85.71% in Quiz C (Sources of Evidence for Evolution), 86.43% in Quiz D (Theories of Evolution) and 100.00% in the last quiz (Ecosystem and Biodiversity). The BLISS significantly helped in the improvement of the students' achievement in terms of quizzes.

The researcher also assessed the students in terms of their laboratory activity performances. The students' scores in laboratory activities are presented in Table 7.

Table 7. Students' Scores in Laboratory Activities

Laboratory Activity	Mean	*sd*	*% of Performance*
A. Getting to Know DNA and RNA structure (10 items)	8.46	1.64	84.64
B. Chromie Change (10 items)	8.46	1.48	84.64
C. Where Do I Belong? (10 items)	8.46	1.52	84.64
D. Dependent or Independent (10 items)	8.93	1.53	89.29
E. Classifying the Value of Biodiversity (10 items)	9.79	0.77	97.86

The mean scores of the students' five laboratory activities increased from 84.64% to 97.86%. The Lab Activity A (Getting to Know DNA and RNA structure), Lab Activity B (Chromie Change) and Lab Activity C (Where Do I Belong?) recorded an 84.64% performance. Meanwhile, Lab Activity D (Dependent or Independent) and Lab Activity E (Classifying the Value of Biodiversity) yielded an 89.29% and 97.86% performance. On the other hand, the calculated standard deviations were fluctuating from 1.64 to 0.77. Although, the sd values still indicated homogeneity in the class performance in terms of laboratory activities.

The infusion of the Biology Learning Station Strategy (BLISS) likewise required participation of the different learning stations. For this reason, the researcher also obtained results from the performance tasks.

Table 8. Students' Scores in Performance Tasks

Performance Task	Mean	*sd*	*% of Performance*
A (5 items)	2.86	2.47	57.14
B (20 items)	15.89	1.72	79.46
C (10 items)	4.46	1.32	89.29
D (8 items)	8.00	0.00	100.00
E (5 items)	5.00	0.00	100.00

The students' achievement in terms of performance tasks also recorded an increasing trend. The students' performance tasks on Genetics, Evolution and Biodiversity increased from 57.14% to 100%. It is significant to note that the Biology Learning Station Strategy helped in the improvement of the class performance.

Level of Science Achievement and Attitude towards Biology after the Application of the Biology Learning Station Strategy (BLISS)

To assess the effectiveness of the strategy used by the researcher, a post-test was administered after the six-week application of the BLISS (Table 9).

Table 9. Frequency Distribution of Students' Scores in Post-test

Class Interval	Frequency	Percent	Descriptive Rating
41-50	2	7.14	Outstanding
31-40	5	17.86	Very Satisfactory
21-30	18	64.29	Satisfactory
11-20	3	10.71	Fairly Satisfactory
1-10	0	0.00	Did Not Meet Expectations
Overall	**28**	**100.00**	**Mean = 27.00 (Satisfactory)**

Post-test results showed that none of the class belonged to did not meet expectations level, 10.71% belonged to Fairly Satisfactory, 64.29% belonged to Satisfactory, 17.86% belonged to Very Satisfactory and 7.14% belonged to Outstanding level. With the weighted mean of 27.00, the class was classified in the Satisfactory level. This finding supports the study of Reiser and Butzin (2000) that "active learning is supported by the extensive use of station activities" in contrast to the traditional whole-class instruction during which students sit passively while the teacher is active. Meanwhile, the students' proficiency level in post-test across domains was presented in Table 10.

Table 10. Students' Proficiency Level in Post-test across Domains

Domain	Average Number of Students *(n=28)*	Percentage (%)
Knowledge	18	62.07
Comprehension	18	62.07
Application	18	62.07
HOTS	16	55.17
Overall	**18**	**62.07**

Based from the table, it can be observed that the students' level of Science achievement marked great improvement after the application of the technique. More than half of the class, 28 students (62.07%), performed well in the four domains. The Knowledge, Comprehension and Application levels yielded 62.07% class performance while HOTS obtained 55.17% class performance. According to the study of Breckler & Azzam (2011), the learning station directly addresses medical student desires for kinesthetic learning opportunities through an innovative approach to teaching basic science. The attitude of the student towards Biology was also determined after the application of the intervention (Table 11). As presented in Table 13, the class had positive attitude (3.65) towards Biology after the intervention. Still, they agreed that Biology helps them in the development of their conceptual skills (3.83). Likewise, the students liked Biology more than other subjects (3.74). They strongly disagreed the statements, "nobody needs biology knowledge" (1.61) and "I hate Biology lessons" (1.93). This supports the study of Osborne, et. al. (2003) that student's attitude toward a particular discipline may affect his or her motivation to excel. In order to facilitate learning, it is therefore important that educators familiarize themselves with students' attitudes and associated behavior.

Table 11. Students' Attitude towards Biology after the Intervention

Statement	Weighted Mean	Verbal Description	Rank
1. I like biology more than other subjects.	3.74	Slightly Agree	2
2. Nature and biology is strange for me.	2.71	Slightly Agree	12
3. Biology lessons are very difficult for me.	2.54	Disagree	13
4. Biology helps in the development of my conceptual skills.	3.83	Agree	1
5. I would like to have biology lessons more often.	3.62	Agree	6
6. Biology knowledge is essential for understanding other courses and phenomena.	3.58	Agree	7
7. During biology lessons, I am bored.	2.04	Disagree	15
8. The progress of biology improves the quality of our lives.	3.43	Slightly Agree	11
9. Biology is our hope for solving many environmental problems.	3.66	Agree	3
10. Biology is not important in comparison with other courses.	2.36	Disagree	14
11. I make many efforts to understand biology.	3.43	Slightly Agree	9
12. Biology is important part of our lives.	3.64	Slightly Agree	5
13. Nobody needs biology knowledge.	1.61	Strongly Disagree	17
14. I hate biology lessons.	1.93	Disagree	16
15. I find biological processes very interesting.	3.65	Agree	4
16. The work with living organisms in biology lessons is very interesting.	3.54	Agree	8
17. Biology is one of the easiest subjects for me.	3.46	Agree	10
Overall Mean	3.65	Positive	

Legend: 4.20-5.00 (Very Positive); 3.40-4.19 (Positive); 2.60-3.39 (Slightly Positive); 1.80-2.59 (Negative); 1.00-1.79 (Very Negative)

To easily see the improvement in terms of Science achievement Results of the students' pre-test and post-test were compared in Table 12.

Table 12. Frequency Distribution of Students' Scores in Pre-test and Post-test

Class Interval	Pretest		Post-test	
	Frequency (n=28)	Percentage (100.00)	Frequency (n=28)	Percentage (100.00)
41-50	0	0.00	2	7.14
31-40	1	3.57	5	17.86
21-30	5	17.86	18	64.29
11-20	22	78.57	3	10.71
1-10	0	0.00	0	0.00
Average	**18.29 (Fairly Satisfactory)**		**27.00 (Satisfactory)**	

It can be observed that there was an improvement on the students' Science achievement. The mean of the Biology test increased from 18.29 to 27.00, yielding 8.71 points increase. Moreover, there was a positive change of 7.14% in the percentage of students who belong to Outstanding and 14.29% in the level of Very Satisfactory. Also, there was a positive difference of 46.43% in the student percentage that belongs to Satisfactory. A -67.86% difference was noted in Fairly Satisfactory on the developing level. Although this marked a positive change, no one belonged to Did Not Meet Expectations level after the application of the strategy. The improvement in the Science achievement was supported by the study of Ryan (2001) who found out that relationships with peers become much more important in early adolescence as children start to spend more time with peers and form relationships that are closer and more intense than before. This is an important detail in the success of students in their academic performance regardless of teaching method. Table 13 presents the comparison of the students' proficiency level in the pre-test and post-test.

Table 13. Students' Proficiency Level in Pre-test and Post-test across Domains

Domain	Pretest		Post-Test	
	Number of Students	Percentage	Number of Students	Percentage
Knowledge	10	34.48	18	62.07
Comprehension	10	24.48	18	62.07
Application	11	37.93	18	62.07
HOTS	7	24.14	16	55.17
Average	**10**	**34.48**	**18**	**62.07**

As gleaned from the table, after the application of BLISS, there was an increase of 27.59% in the students' Knowledge and Comprehension domain, 24.14% increase in Application and 31.03% difference in their Higher Order Thinking Skills (HOTS). An increase of 27.59% on the calculated mean likewise determines the effectiveness of the strategy. Generally, the BLISS improved all the achievement domains of the junior high school students. This finding is supported by Kleckauskas (2010) who said that students engaged in learning stations helped one another out and perform better than in a regular or traditional classroom setting. According to Ball (1992) and Hartnett & Gelman (1998) as cited by Welch (2010), experience with the physical world is critical to the formation of schemes and is found in most classrooms in the form of "hands-on" activities.

Significant Difference on the Science Achievement and Attitude of Students after the Application of BLISS

To easily determine the significant change in the Science achievement of the class prior and after the application of BLISS, a t-test table of Biology achievement test and attitude is presented in Table 14.

Table 14. T-test of the Pre-test and Post-test Mean Gain of the Grade 10 Science Students in the Biology Achievement Test and Attitude Scale

Variable	Posttest Mean	Pretest Mean	Gain Score	*t*-value	*p*-value	Remarks
Achievement Test	27.00	18.29	8.71	12.045	0.000	Significant
Attitude Scale	3.65	3.37	0.91	0.817	0.421	Not Significant

p<.05

The table showed a gain score of 8.71 from the pre-test mean score of 18.29 to post-test mean score of 27.00, indicating that there was an improvement in the Science achievement of the students with the use of the

intervention. The t-test of dependent sample was employed to determine if there exists a significant difference after the application of the strategy. The t-value gained was 12.045 and the p-value was 0.0000. This implies that there is a significant difference in the Science achievement of Grade 10 Science students after the application of the Biology Learning Station Strategy (BLISS). This finding is parallel to the study of Ocak (2008) that the academic achievement levels of the group that was taught using the learning stations were significantly higher than the group taught using the conventional educational methods. Learning stations are more effective than the conventional methods in helping students acquire the knowledge in a unit.

As indicated, the attitude gain score of students was 0.91 and a t-value of 0.817 and a p-value of 0.421 which means that there is no significant difference in the attitude of the students after the application of BLISS. Prior and after the intervention, the students have positive attitude towards Biology. As cited by Moore (2003), attitude transformation takes time, effort, and determination, but it can be done. It is important not to expect to change a person's attitudes quickly. Managers [teachers] need to understand that attitude change takes time and should not set unrealistic expectations for rapid change. Moreover, empirical studies provide evidence that constructivist-learning environments in science and mathematics can have a positive impact on students' attitudes in both science and mathematics (Welch, 2010).

Significant Relationship between Science Achievement and Attitude

Table 15 presents the test of hypothesis if a relationship between Science achievement and attitude towards Biology of the students exists (Table 18).

Table 15. Correlation between Science Achievement (SA) and Attitude towards Biology (ATB)

Particulars	Value	Verbal Description
Pearson Correlation Coefficient (r) between SA and ATB	0.390	Low Correlation

The computed Pearson correlation coefficient (r) is 0.390 interpreted as "Low Positive Correlation." This study concludes that there exists a significant positive relationship between level of Science achievement of junior high school Science students. As students view Biology very positive, it will follow that their Science achievement will likely increase. This finding is corroborated by the findings of Cakici & Turkmen (2013) that many studies have found positive relationship between attitude toward science and higher science achievement (Schibeci & Riley, 1986; Oliver & Simpson, 1988; Schibeci, 1989; Freedman 1997), thus teachers should give particular attention to both student-centred teaching strategies and students' attitudes in science lessons.

Conclusions

From the aforementioned findings, the following conclusions are derived:

1. Prior to the intervention, the junior high school Science students are performing below average in terms of Science achievement and have slightly positive attitude towards Biology.
2. After the intervention, the students' Science achievement and their attitude towards Biology have improved.
3. BLISS is an effective strategy in improving the Science achievement and attitude towards Biology of students.
4. There is a positive relationship between Science achievement and attitude towards Biology.

Recommendations

The study recommends the following:

1. Science teachers should gauge the attitude of the students towards the subject to determine the effective teaching strategies which will enhance students' interest and achievement.
2. The BLISS must be infused in a longer duration in the learning process to fully assess the strategy's effect in improving students' achievement and attitude towards Biology.
3. Science teachers should consider using the Biology Learning Station Strategy (BLISS) to improve both Science achievement and attitude towards Biology of the learners.
4. A parallel study may be conducted by other teacher-researchers to validate the effect of the intervention in enhancing students' achievement and attitude as well as to measure their relationship. A quasi-

experimental research using control and experimental groups may be conducted to explore if there exists a significant different between BLISS and traditional method of teaching.

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