MULTIPLE INTELLIGENCES AS BASIS FOR THE USE OF LEARNING STATION IN TEACHING BIOLOGY

RANDY R. BINAG
https://orcid.org/0000-0002-9381-4622
randybinag98@gmail.com
Bagong Silang High School
Caloocan City, Philippines

ABSTRACT

One of the big challenges the science education faces is identifying whether learning has occurred when doing what is called "one-size-fits-all" type of activities. Thus, different strategies and approaches in teaching science have been proposed and used by educators to accommodate the complexity of the learners. The study covered the identification of multiple intelligences of Grade 8 students and its effect on multiple intelligence-based learning stations in teaching Biology. This study also determined to examine the efficiency and usability of Learning Station in teaching Biology and how it enhanced students' performance. The period of research covered the fourth quarter of Grade 8 Science, School Year 2017-2018. In this view, the study employed the mixed- approach in research which comprised of descriptive and quasi-experimental one group research design. The Dominant Multiple Intelligences (MI) exhibited by Grade 8 students as assess showed that there were four (4) MI and these include Kinesthetic, Intrapersonal, Musical and Existential. More so, topics in teaching Biology 8 that were considered or the basis in using developed learning station. Furthermore, the students' performance in every station based on their pre-test and post-test in terms of Mean Score, MPS, and SD showed that there is an increase in terms of the score from the post-test and pre-test. Considerably, the increase is significant. The assessment on comments and suggestions of the developed learning station showed that it is cost-efficient and economical, the language used is appropriate to users' age, great number of students to execute at a time and easy to store and transport, and have a maximum collaboration on shared products, and activities appropriate on classroom size.

Keywords: Multiple Intelligences, Learning Station, Teaching Strategy, Students Centered Learning, Descriptive method, Secondary High School, Philippines

INTRODUCTION

Human intelligence is not only determined by a pen and paper method of assessment but, in many different ways. Multiple intelligences helps the educators and psychologists to understand learners' diverse capabilities to assimilate the information in their surrounding by utilizing their intelligences not, as one general skill but a combination of different specific manners, in which, they are independent to one another and present in all humans. Ignacio Estrada, the Director of Grants Administration of Gordon and Betty Moore Foundation in San Francisco once stated, "If a child can't learn the way we teach, maybe we should teach the way they learn". Every learner is unique. Learners have their way of understanding the lesson depending on the types of intelligence they possess. The teacher sometimes neglects individual differences of the learners. Teachers tend to teach as if all students have the same level of intelligence and interest in the subject matter. Psychologist Howard Gardner proposed the Theory of Multiple Intelligence in his

P – ISSN 2651 - 7701 | E – ISSN 2651 – 771X | www.ioer-imrj.com
BINAG, R.R., *Multiple Intelligences as Basis for the Use of Learning Station, pp. 72 -81*

72

book entitled Frames of the Mind. In this theory, he defined the existence of at least seven basic intelligence and more recently, he has added an eighth and discussed the possibility of a ninth (Armstrong, 2009). These eight measures of multiple intelligence are linguistics, logical-mathematics, visual-spatial, interpersonal, intrapersonal, musical, bodily-kinesthetic, and naturalist. For Gardner, intelligence has more to do with the capacity for solving problems and fashioning products in a context-rich and naturalistic setting. Some learners find science as one of the difficult subjects in school. Xie and Lin (2009), stated that human abilities and potentials are direct evidences that multiple intelligences exist, and these intelligences can be fully utilized either individually or combined. Science teachers give hands-on activities related to the topic for the students to discover the essential concept in a meaningful way. And for a clearer understanding of the concept to be learned, the teacher will discuss the essence of the activity and will assess to evaluate if learning has occurred. One of the big challenges the science education faces, is, identifying whether learning occurred when doing what is called "one-size-fits-all" type of activities. Thus, different strategies and approaches in teaching science have been proposed and used by educators to accommodate the complexity of the learners. Furthermore, The Department of Education supports the idea of reaching diverse learners and to acquire the basic knowledge and skills approaches such as differentiated instruction is presented. Also, the multiple intelligences theory will help learners understand concepts in different ways on their capacity. Giving scores based on student's group performance usually means identifying who are intelligent learners and who are not. But according to Gardner (1999) as stated by Lunenburg and Lunenburg (2014), Intelligence is the ability to create an effective product or offer a service that is valued in a culture, a set of skills that make it possible for a person to solve problems in

life, and the potential for finding or creating solutions for problems, which involves gathering new knowledge. In the present, the K to 12 Curriculum of the Department of Education Program uses integrative, inquiry-based, and constructive approaches to develop the competencies of learner presented to assure that it is a learner-centered program. One of the ways on how the learners understand the subject matter through experiential learning is classroom activity. Educators use these activities to relate the topic with learner's everyday experiences so that they can easily grasp the concept faster and retain the knowledge longer. Through these activities, the learners apply their prior knowledge and skills to be able to solve and carry out the given activities, and these activities are sometimes done in groups. Teachers will only act as mere facilitators. And for the learners to be graded faster, teachers will give the same procedure to all groups making other learners get bored easily, some learners do not participate, and in the worse case, some learners cannot finish the given activity at a given time. These cases make the teacher's objectives for the day unsuccessful and leaving these learners behind so that teachers can proceed to the next topic. Teachers tagged their learners who performed well and finished the activity as well-motivated and intelligent giving high scores, while, learners who did not complete the activity as struggling learners and ended up having low grades in the performance tasks. This exposes the learners to the different hands-on, minds-on and hearts-on activities which can help them to become active learners. Grouping learners using the Multiple Intelligences Theory during classroom activities and giving suited activities based on their intelligence will increase the level of learner's achievement and performance in conducting an activity. Thus, this study was conducted intently to introduce learning stations to be used in attaining the meaningful teaching-learning process. To address individual differences among learners, the

P – ISSN 2651 - 7701 | E – ISSN 2651 – 771X | www.ioer-imrj.com
BINAG, R.R., *Multiple Intelligences as Basis for the Use of Learning Station, pp. 72 -81*

73

study purposely aimed to develop a better way of accommodating individual differences inside the classroom by giving activities suitable to the learner's types of intelligence. Particularly, this study determined the effectiveness of learning station in teaching Biology and also helped the educators to understand each learner better and provide specific support wherever and whenever deemed necessary.

CONCEPTUAL FRAMEWORK

The figure below shows that using the dominant type of intelligence of a learner should use to enhance learner's performances. In the given diagram below, pre-test and post-test were conducted to determine the student's progress in terms of their performance.
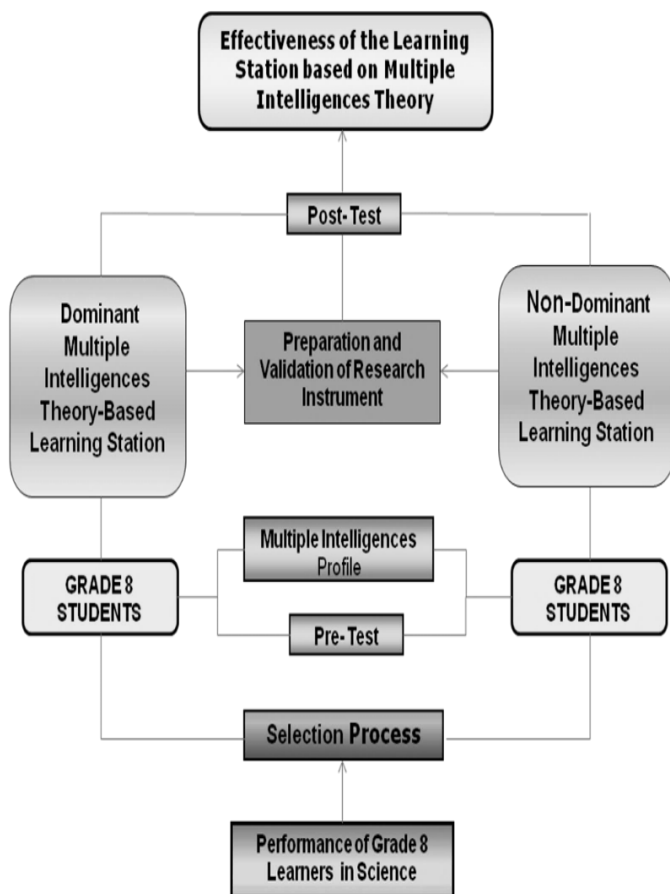

Figure 1: Research Paradigm

Howard Gardner's Theory of Intelligence proposes that every individual has a unique combination of eight types of intelligence which are amenable to the development among people in giving them different ways to learn (Kandeel, 2016). Smith (2008), described intelligence are as follows: the first two have been typically values in schools, the next three are usually associated with arts and the final two are called by Gardner as "personal intelligence" such as the Linguistic intelligence describes as sensitivity to spoken and written language, the ability to learn languages, and the capacity to use language to accomplish certain goals. Also, logical-mathematical intelligence consists of the capability to analyze problems logically, carry out mathematical operations and investigate issues scientifically. It entails the ability to detect patterns, reason deductively and think logically. This is most often associated with scientific and mathematical thinking. More so, Musical intelligence involves skills in performance, composition, and appreciation of musical patterns. It encompasses the capacity to recognize and compose musical pitches, tones, and rhythms. It runs in an almost structural parallel to linguistic intelligence. Furthermore, Bodily-kinesthetic intelligence entails the potential of using one's whole body or parts of the body to solve problems. It is the ability to use mental abilities to coordinate bodily movements. On the other hand, Spatial intelligence involves the potential to recognize and use the patterns of wide space and more confined areas. For interpersonal intelligence is concerned with the capacity to understand the intentions, motivations, and desires of other people. It allows people to work effectively with others. While, the Interpersonal intelligence entails the capacity to understand oneself to appreciate one's feelings, fears, and motivation. It involves having an effective working model of ourselves and to be able to use such information to regulate our lives. Also, Naturalist intelligence enables human beings to recognize, categorize and draw upon certain features of the environment. It combines a description of the core ability with a characterization of the role that many culture value. And, finally for, Existential intelligence, it is the sensitivity and capacity to tackle deep questions about human existence

P – ISSN 2651 - 7701 | E – ISSN 2651 – 771X | www.ioer-imrj.com
BINAG, R.R., *Multiple Intelligences as Basis for the Use of Learning Station, pp. 72 -81*

74

such as the meaning of life, why do we die, and how did we get here. All students in each class were set as subjects for research, and the group was subjected to the activity which is based on their dominant intelligence. The researcher prepared a lesson plan, table of specification, test questionnaire, and selected Biology activities to be used and be validated by experts. Utilization of the materials was placed after the validation. The summative assessment was conducted to the groups to determine the effectiveness of the treatment. Analysis and interpretation of the result identified the effectiveness of the learning stations as evidenced by the mastery level of the students in the group.

OBJECTIVES OF THE STUDY

This study aimed to determine the effect of learning stations in teaching Biology among Grade 8 students at Bagong Silang High School to elicit multiple intelligences. Specific aims included the following: (1) to identify the multiple dominant intelligences of Grade 8 students of Bagong Silang High School. (2) to know the topics in Biology that can be considered in designing a learning station. (3) to name the different learning stations employed by the teacher in teaching Biology. (4) to compare the performance of the students in every learning station based on their Pre-test and Post-test scores. (5) to give the comments and suggestions of Biology teachers on the designed learning stations.

METHODOLOGY

The researcher used mixed-approach qualitative descriptive research method to determine the effectiveness of multiple intelligences –based learning station in teaching Grade 8 Science. The study employed the quasi-experimental group design. The researcher utilized the sections Argon, Iron, Krypton, and Sulfur in Grade 8 of Bagong Silang High School, School Year 2017-2018 comprising of 168 students. In the study, the researcher utilized for its research the Mc Kenzie's Multiple Intelligences Survey, teacher-made Pre-test and Post-test, TOS, Lesson Plan, Learners' Manual, Curriculum Guide, Teachers Guide and the developed Learning Station in

Biology 8. Similarly, the researcher also interviewed student-respondents to gather baseline information for the general conduct of the study, as well as, in the manner of assessing the performance of the student-respondents before and after using the Learning Station in teaching-learning activities for Grade 8 Biology. The data from the study were gathered using the anecdotal procedure. This was made possible by taking into account the details from the activities employed in the study. Scores from the pre-test and post-test were the primary data considered by the researcher. Also, the suggestions or comments through an informal interview for additional insights related to the study were taken into account. The data gathered from the questionnaire were tallied, tabulated, and analyzed using the Percentage, Weighted Mean, A 5-point scaling techniques and Mean were used as statistical tools.

RESULTS AND DISCUSSION

1. Dominant Multiple Intelligences of Grade 8 Students of Bagong Silang High School.

Table 1: Dominant Multiple Intelligences of Grade 8 Student Respondents

MULTIPLE INTELLIGENCE	MEAN AVE	RANK
1. Natural	5.71	7
2. Musical	6.23	3
3. Logical	5.70	8
4. Existential	6.44	2
5. Interpersonal	5.96	5
6. Kinesthetic	6.55	1
7. Verbal	5.39	9
8. Intrapersonal	6.16	4
9. Visual	5.94	6

Reflected in Table 1 are the Dominant Multiple Intelligences (MI) exhibited by Grade 8 students. As assessed, the dominant Multiple Intelligence (MI) exhibited by Grade 8 students shows that for Natural MI rank 7 with a weighted

P – ISSN 2651 - 7701 | E – ISSN 2651 – 771X | www.ioer-imrj.com
BINAG, R.R., *Multiple Intelligences as Basis for the Use of Learning Station, pp. 72 -81*

75

mean of 5.71, while Musical MI rank 3 with a weighted mean of 6.23. On the other hand, Logical MI with a weighted mean of 5.70 is rank 8; Existential MI rank 2 with a weighted mean of 6.44, Interpersonal is rank 5 with a weighted mean of 5.96. Kinesthetic with a weighted mean of 6.55 is rank 1, Verbal rank 9 with a weighted mean of 5.39, Intrapersonal rank 4 with a weighted mean of 6.16 and Visual is rank 6 with a weighted mean of 5.94. Gende (2011) articulated the most important component of the learning process inside the science class is finding answers to the problem and not the answers itself. Educators around the world are searching for the different approaches and strategies to make a meaningful teaching-and-learning process where students can discover new concepts and improve their scientific skills using their various facets of learning. On the other hand, Rice (2008) reiterated Wieman's idea of an effective science education transforms how students think. This is by developing the so-called "expert-like thinking" through a concept-based strategy to retrieve and to use the facts to solve problems and the ability to monitor one's thinking and learning which is more important than giving students facts and equations to memorize.

2. Topics in Teaching Biology considered in designing Learning Station.

Table 2: Topics in Teaching Biology 8 Basis in Designing Learning Station

Topics	Learning Competency	MPS	VI
1. Transfer of Energy in Trophic levels	Describe the transfer of energy through the trophic levels	25.34	No Mastery
2. Impact of human activities in an ecosystem	Suggest ways to minimize human impact in the environment	27.59	No Mastery
Mean Average		**26.47**	No Mastery

Presented in Table 2 are topics in teaching Biology 8 that is considered or the basis in using developed Learning Station. Considering the data gathered, it shows that for topic 1, "Transfer of energy in trophic levels" with learning competency to describe the transfer of energy through the trophic levels have a mean percentage score (MPS) of 25.34 and verbally interpreted to be of No Mastery. More so, for topic 2, "Impact of human activities in an ecosystem," with learning competency suggests ways to minimize human impact on the environment the computed MPS is 27.59 and said to be of No Mastery. The mean average computed was 26.47 and interpreted to be of No Mastery. In the Philippines, many efforts are made by the Department of Education to develop scientific attitudes and inquiry skills of Filipino students. The multi/interdisciplinary approach, science-technology-society approach, contextual learning, problem/issue-based learning, and inquiry-based approach are used and injected in the curriculum which is based on the following sound educational namely, constructivism, social cognition learning model, learning style theory, and brain-based learning (Department of Education, 2013) to make Filipino students become scientifically, technologically and environmentally literate citizen. Various hands-on, minds-on, and hearts-on activities should be used instead of using textbooks only in class to develop learners' interest and become active learners.

3. Different Learning Stations employed by the teacher in teaching Biology.

Table 3: Learning Stations employed in teaching Biology 8

LEARNING STATION	MULTIPLE INTELLIGENCE
1. Lights, Camera, Action	Kinesthetic
2. Commercially Yours	Kinesthetic
3. Thinking out Loud	Intrapersonal
4. Pictures Paint a Thousand Words	Intrapersonal
5. DJ, Play Me A Song	Musical
6. Jam with Us	Musical
7. Let's Sort It	Existential
8. If I were to teach	Existential

In Table 3, the presentation of learning stations employed in teaching Biology 8 shows

P – ISSN 2651 - 7701 | E – ISSN 2651 – 771X | www.ioer-imrj.com
BINAG, R.R., *Multiple Intelligences as Basis for the Use of Learning Station, pp. 72 -81*

76

that there are eight stations prepared for Multiple Intelligences (MI) exhibited by the students. This indicates that Kinesthetic have two learning stations such as Lights, Camera, Action and Commercially Yours. For Intrapersonal, the developed learning stations are Thinking out Loud, and Pictures Paint a Thousand Words. On the other hand, for MI Musical the learning stations are DJ, Play Me a Song and Jam with us, while for MI Existential, the learning stations are Let's sort it and If I were to teach. Armstrong (2011), argued whatever we teach and learn can be connected to different intelligence that is why it is extremely essential to the teaching and learning process in

any environment like the use of words to linguistic intelligence, numbers or logic to logical-mathematical intelligence, pictures to spatial intelligence, music to musical intelligence, self-reflection to intrapersonal intelligence, a physical experience to bodily-kinesthetic intelligence, a social experience to interpersonal intelligence, and/or an experience in the natural world to naturalist intelligence. In relation to Multiple intelligence, creating educational experiences based in natural talents make students become actively engaged in learning experiences (Macias, 2013), and more effective in knowledge transfer (Laughlin and Foley, 2012).

4. Students performance in every Learning Stations based on their Pre-test and Post-test scores.

Table 4: Performance in Learning Station based on the Pre-Test and Post- Test Scores

LEARNING STATION	MEAN SCORE		MPS		SD	
	PRE-TEST	POST-TEST	PRE-TEST	POST-TEST	PRE-TEST	POST-TEST
1. Lights, Camera, Action	11.22	16.74	28.05	41.84	3.98	5.62
2. Commercially Yours	10.45	15.69	27.68	40.29	3.57	5.92
3. Thinking out Loud	11.60	17.85	29.00	44.63	3.80	6.68
4. Pictures Paint a Thousand Words	12.10	19.06	29.17	45.02	3.98	7.14
5. DJ, Play Me A Song	13.24	19.97	33.09	49.93	4.65	7.35
6. Jam with Us	12.68	18.43	32.84	48.19	4.06	6.98
7. Let's Sort It	12.82	19.16	32.05	47.90	5.32	6.06
8. If I were to teach	12.15	18.74	31.68	47.22	5.19	5.97

Interpretation: **Pre-test Result: Low Mean; High SD; Proficiency level is below 75%**
Post-test Result: High Mean; High SD; Proficiency level is above 75%

Shown in Table 4 are the students' performance in every station based on their pre-test and post-test the students' performance in every station based on their pre-test and post-test. The data shows that for "Lights, Camera, Action" and "Commercially Yours" both addresses the Kinesthetic MI with a computed Pre-test Mean Score, MPS, and SD of 11.22, 28.05 and 3.98 respectively, while the post-test results show 16.74, 41.84, and 5.62 scores in the Mean, MPS, and SD respectively. For Intrapersonal, the Learning Station developed were "Thinking out loud" with a Pre-test mean score of 11.60, MPS 29.00, and SD 3.80 and a post-test mean score of 17.85, MPS of 44.53, and SD 6.68. Also for Learning Station "Pictures Paint a Thousand

Words," the result in the pre-test shows a mean score 12.10, an MPS 29.17, and an SD of 3.98, and for the post-test scores obtained in the mean is 19.06, MPS is 45.02, and SD of 7.14. However, for MI Musical, the learning Station developed were "DJ, Play Me A Song" with a pre-test mean score of 13.24, MPS of 33.09, and SD of 4.65, while the post-test mean score is 19.97, MPS of 49.93, and SD of 7.35, while for the other Learning Station entitled "Jam with Us", the computed scores for Pre-test mean score is 12.68, MPS of 32.84, and SD of 4.06 while post-test computed scores for the mean is 18.43, the MPS is 48.19, and SD of 6.98. Furthermore, for Learning station assessed on MI Existential the first activity is "Let's Sort It" the pre-test scores for Mean, MPS, and SD

P – ISSN 2651 - 7701 | E – ISSN 2651 – 771X | www.ioer-imrj.com
BINAG, R.R., *Multiple Intelligences as Basis for the Use of Learning Station, pp. 72 -81*

77

are 12.82, 32.05, and 5.32 respectively while the post-test scores for mean is 19.16, MPS is 47.90, and SD 6.06. For the other activity "If I were to teach" the pre-test computed mean score is 12.15, MPS of 31.68, and SD of 5.19, while the post-test result shows a mean score of 18.74, an MPS of 47.22, and an SD of 5.97. Based on the gathered data, the interpretation could be posted for Pre-test; it shows that there is a Low Mean, High SD, and Proficiency level is below 75%. For the Post-test result, it shows a High Mean, High SD, and Proficiency level is above 75%. The findings were supported by Taspinar and Kaya (2016), revealed a significant increase in the success of the students and a positive effect on the permanence of knowledge learned by the students who teacher implemented activities designed for their strongest types of intelligence through Multiple Intelligences Theory-based instruction. This is further sustained by the study of iFLAZOGLU SABAN (2011), students could learn better and permanently if they could use one-intelligence learning activities. In the study of Burbos, Delos Reyes, and Duad (2017) showed that there is no significant difference in the student achievement when they are categorized according to their multiple intelligences, but there is a significant relationship among multiple intelligences and science achievement.

5. Comments and Suggestions of Biology teachers on the designed Learning Station

As shown in Table 5, the comments and suggestions of Biology teachers on the Learning Station developed. The assessment on comments and suggestions of the developed learning station shows that for criteria 1 "cost efficient and economical" with a weighted mean 4.90 is interpreted to be Fully Evident is rank 1. In rank 2 is criteria 2 "the language use is appropriate to users' age," with a weighted mean of 4.85 is interpreted to be Fully Evident. In rank 3, are criteria 3, "has a great number of students to execute at a time" and criteria 4 "can be stored and transported easily" with a weighted mean of 4.75 and both interpreted to be Fully Evident. For criteria 5 "have maximum collaboration on shared products" and criteria 6 "activities appropriate on the class size" with a weighted mean of 4.70 interpreted to be Fully Evident are tied in rank 5.5.

Table 5: Comments and Suggestions of Biology Teachers on the Learning Station

CRITERIA The Learning Station….	WM	VI
1. cost-efficient and economical	4.90	Fully Evident
2. the language used is appropriate to users' age	4.85	Fully Evident
3. has a great number of students to execute at a time	4.75	Fully Evident
4. can be stored & transported easily	4.75	Fully Evident
5. have a maximum collaboration on shared products	4.70	Fully Evident
6. activities appropriate on classroom size	4.70	Fully Evident
7. involves more senses	4.65	Fully Evident
8. can be used even without supervision	4.60	Fully Evident
9. requires less time and effort to construct	4.50	Mostly Evident
10. the activity requires a tangible product to demonstrate learning and assessment	4.20	Mostly Evident
Mean Average	**4.66**	**Fully Evident**

In rank 7 and 8 are criteria 7 "involves more senses" with a weighted mean of 4.65 and criteria 8 "can be used even without supervision" with a weighted mean of 4.60 were interpreted to be Fully Evident, respectively. On the other hand, in rank 9 and 10, criteria 9 "requires less time and effort to construct" with a weighted mean of 4.50 and criteria 10 "activity requires a tangible product to demonstrate learning and assessment" with a weighted mean of 4.20 was interpreted to be Mostly Evident. In the study made by Soleimani, Moinnzadeh, Kassaian, and Ketabi (2012), gleaned that students exposed to various approaches and methods and found the activities interesting, students learn and experience less anxiety because students don't feel they don't know something in the multiple intelligences-based classrooms causing a change in the attitude that removes boundaries in learning effectively. This is further sustained by Abdi, Laei and Ahmadyan (2013), argued students became more actively engaged and invested in their learning process if they are offered with a variety of learning experiences which result to more frequent participation and retain more knowledge because

P – ISSN 2651 - 7701 | E – ISSN 2651 – 771X | www.ioer-imrj.com
BINAG, R.R., *Multiple Intelligences as Basis for the Use of Learning Station, pp. 72 -81*

78

students understand the material in a more cmplex way.

CONCLUSIONS

These are the key points that the researcher came up from the findings presented.

1. The Dominant Multiple Intelligences (MI) exhibited by Grade 8 students as assess shows that there are four (4) MI and these include Kinesthetic, Intrapersonal, Musical, and Existential.
2. Topics in teaching Biology 8 that is considered or the basis in using developed Learning Station were "Transfer of energy in trophic levels" and "Impact of human activities in an ecosystem."
3. Presentation of Learning Stations employed in teaching Biology 8 shows that there are eight (8) stations prepared for four (4) Multiple Intelligences (MI) exhibited by the students.
4. The students' performance in every station based on their pre-test and post-test in terms of Mean Score, MPS and SD shows that there is an increase in terms of the score from the post-test and pre-test. Considerably, the increase is significant.
5. The assessment on comments and suggestions of the developed learning station shows that it is cost-efficient and economical, the language used are appropriate to users' age, has great number of students to execute at a time and easy to store and transport, have maximum collaboration on shared products, activities appropriate on classroom size, involves more senses, can be used even without supervision, requires less time to construct, and activity requires a tangible product to demonstrate learning and assessment.

RECOMMENDATIONS

In light of the findings of this research, the following recommendations are hereby presented:

1. Teachers should develop similar educational manipulative align with learning competencies in science based on the prescribed curriculum guide. Furthermore, teachers are advised to conduct a learning plan in the integration of manipulative in the curriculum prepared.
2. The School Administrator, Department Head should support teachers in the integration of manipulative inside the classroom to enhance the teaching-learning process further.
3. The government through the Department of education can utilize the result of the study to provide financial assistance for the development of instructional material, specifically in science.
4. The researcher himself could use the result of the study to design other manipulative that could be an aid in arousing learners' interest in science subjects.
5. The future researcher could use the result of the study to further investigate the impact of integrating manipulative in teaching biology in boasting interest of learners.

REFERENCES

Abdi, A., Laei, S., & Ahmadyan, H. (2013). *The Effect of Teaching Strategy Based on Multiple Intelligences on Student's Academic Achievement in Science Course.* Universal Journal of Educational Research, 1(4) p. 281-284. Retrieved from: https://eric.ed.gov/?q=multiple+intelligences+in+classroom<=on&ft=on&pg=3&id=EJ1053949

Armstrong, T. (2011). *Multiple Intelligences.* Retrieved from: http://www.institute4learning.com/resources/articles/multiple-intelligences/

Burbos, L.R., Delos Reyes, M.J.M. & Duad, V.D. (2017). *Multiple Intelligences and Science Achievement at Philippine Normal University.* Book of Abstracts. 2nd International Congress Action Research, Action Learning ARAL 2017. De La Salle University-Manila, Philippines. p. 80. Retrieved from: https://www.araldlsu.net/

P – ISSN 2651 - 7701 | E – ISSN 2651 – 771X | www.ioer-imrj.com
BINAG, R.R., *Multiple Intelligences as Basis for the Use of Learning Station, pp. 72 -81*

79

Gende, D. (2011, March 8). *"21st Century Science Teaching: Getting students beyond formula hunting strategies".* The How of 21st Century Teaching, Voices. Retrieved from http://plpnetwork.com/2011/03/08/21st-century-science-teaching-getting-students-beyond-formula-hunting-strategies/

iFLAZOGLU SABAN, A. (2011). *An Evaluation of the Teaching Activities Implemented in the Elementary Science and Technology Course in Terms of Multiple Intelligence Theory: A Sample from Adana.* Educational Sciences: Theory and Practice. 11(3) p. 1641-1649. Summer of 2011. Retrieved from: https://eric.ed.gov/?q=multiple+intelligence+theory+in+class<=on&f=on&id=EJ936341

K to 12 Curriculum Guide Science Grade 3 to Grade 10. (2013). Department of Education. Philippines.

Kandeel, R. (2016). *Multiple Intelligences Patterns of Students at King Saud University and Its Relationship with Mathematics Achievement.* Journal of Education and Learning. 5 (3) p.94-106. Retrieved from https://eric.ed.gov/?q=multiple+intelligence+theory+in+class<=on&f=on&pg=2&id=EJ1100962

Laughlin, K., & Foley, A. (2012). *"Intelligences That Plants Can Pass On." Play Dough, Fun and Teaching Strategies with Insights to Multiple Intelligences.* Journal of Adult Education. 41(1) p.22-28. Retrieved from https://eric.ed.gov/?q=multiple+intelligences+in+classroom<=on&ft=on&pg=2&id=EJ991441

Lunenburg,F & Lunenburg,M. (2014). *Applying Multiple Intelligences in the Classroom: A Fresh look at Teaching Writing.* International Journal of Scholarly Academic Intellectual Diversity. (16). Retrieved from: https://pdfs.semanticscholar.org/1140/675d1f0174400842ca72bf25ccf287b9fea0d.pdf

Macias, F.A.D. (2013). *Development of the Distinct Multiple Intelligences in Primary Students Through Interest Centers.* HOW, Columbian Journal for Teachers of English. 20 (1) p. 90-115. Retrieved from https://eric.ed.gov/?q=mutiple+intelligence+theory+in+class<=on&ft=on&id+=EJ1127914

McKenzie, W. (2014, July 14). *MI21: Multiple Intelligences and Preparing Children for the 21st Century.* The Whole Child Blog. Retrieved from:https://www.wholechildeducation.org/blog/mi21-multiple-intelligences-and-preparing-children-for-the-21st-century

Rice, M. (2008). "*Nobelist Carl Wieman: Use science to teach science*". Retrieved from http://news.cornell.edu/stories/2008/09/nobelist-carl-wiemen-use-science-teach-science

SEI-DOST & UP NISMED, (2011). *Science framework for Philippine basic education.* Manila: SEI-DOST & UP NISMED. Retrieved from http://www.sei.dost.gov.ph/images/downloads/publ/sei_scibasic.pdf

Smith, M.K. (2008). *Howard Gardner, Multiple Intelligences and Education.* Retrieved from http://infed.org/mobi/howard-gardner-multiple-intelligences-and-education/

Soleimani, H.; Moinnzadeh, A.; Kassaian, Z.; & Ketabi, S. (2012). *The Effect of Instruction Based on Multiple Intelligences Theory on the Attitude and Learning of General English.* English Language Teaching. 5(9) p. 45-53. Retrieved from: https://eric.ed.gov/?q=multiple+intelligences+theory+<=on&ft+on&p-2&id=EJ1079913

Taspinar, S.E. & Kaya, A. (2016). *Painting with the Multiple Intelligences: Defining Student Success and Permanence in Art Class.* Journal of Education and Training Studies. 4(7). P 259-264. July 2016. Retrieved from: https://eric.ed.gov/?ft=on&q=multiple+intelligences+theory+&ff1=dtysince_2013=EJ1106762

Xie, J. & Lin, R (2009). *Research on Multiple Intelligences and Assessment. Asian Journal of Management and Humanity Sciences,* 4 (2-3), p.106-124.

P – ISSN 2651 - 7701 | E – ISSN 2651 – 771X | www.ioer-imrj.com
BINAG, R.R., *Multiple Intelligences as Basis for the Use of Learning Station, pp. 72 -81*

80

Yilmaz, B.(2012). *Engaging 6th Grade Students with Mathematics Using Multiple Intelligence Theory*. Unpublished Thesis. Bilkent University, Ankara.

AUTHOR'S PROFILE

Randy Rivera Binag received the Bachelor of Secondary Education major in General Science in 2004 at the Philippine Normal University-Manila, Master of Arts in Teaching Science in 2018 at the University of Caloocan City. He is currently working at Bagong Silang High School- DepEd Caloocan as Secondary Teacher II and handles Grade 8 Science.

COPYRIGHTS

P – ISSN 2651 - 7701 | E – ISSN 2651 – 771X | www.ioer-imrj.com
BINAG, R.R., *Multiple Intelligences as Basis for the Use of Learning Station, pp. 72 -81*

81