

Learning activities in grade 8 biology based on students' learning preferences

Ocayo, Carlo ✉

Bicol University, Philippines (carlo.ocayo22@gmail.com)

Mirandilla, Maria Teresa

Bicol University, Philippines (mtamirandilla@bicol-u.edu.ph)



ISSN: 2243-7703
Online ISSN: 2243-7711

OPEN ACCESS

Received: 5 July 2022

Revised: 15 August 2022

Accepted: 18 November 2022

Available Online: 18 November 2022

DOI: 10.5861/ijrse.2022.340

Abstract

The K to 12 Program was implemented to equip Filipino learners with skills and competencies to address the demands of the 21st Century. However, national and international assessment studies reflect the need of continuously improving the quality of basic education in the Philippines. This problem on education was exacerbated by the occurrence of COVID-19 pandemic. Each student has their own understanding and capabilities. Improvement on learning may be brought by considering students' learning preference which can tell the way they acquire or understand information. In this regard, this study developed learning activities and determined the effects on the learning of students of different learning preferences in Oro Site High School. The researcher employed a descriptive developmental research method. The participants took the VARK questionnaire and identified four (4) groups of learning preference. Consequently, supplementary learning activities were developed which addressed the learning preferences identified from the respondents. Hence, each topic consists of visual, aural, read/write, and kinesthetic activities which was given and accomplished by students. The nature of engagement of the learners were documented through the journal entry guide. Based on their responses, the developed activities aroused varying forms of engagement which gauge them to accomplish the activities. As a result, the learning activities promotes a numerical and adjectival improvement on the students' conceptual understanding. Further studies may be conducted in line with the present undertaking considering control and experimental group of students to have a basis for comparison anent the effect of learning activities based on students' learning preferences.

Keywords: learning preference, learning activity, nature of engagement, conceptual understanding, distance learning

Learning activities in grade 8 biology based on students' learning preferences

1. Introduction

The implementation of the K-12 program in the Basic Education curriculum aims to improve the teaching program in the Philippines. In connection to this, sufficient instructional time on various subjects is provided to students for them to learn, practice and apply their knowledge, skills, and abilities effectively. Schools are mandated to provide fullest possible development for the learners that can be useful for both life-long learning and employment. They implement different programs, projects, and activities for the students that can be very beneficial for their academic growth. However, the result of national and international assessment studies revealed that there is a need to continuously improve the education system in the Philippines after the implementation of the K-12 program.

The COVID-19 pandemic has created the largest disruption of classes. To continue learning despite the pandemic, distance learning options were adopted and developed. Learning activities are supplementary materials that can be beneficial for distance learning. The said activity is critically important so as to achieve the intended learning outcome of the students. For many researchers, implementing appropriate activities can be beneficial to learners because this can cater students' enjoyment within the learning environment and can bring about possible scholastic advantage (Zhu, 2012; Chanseawrassamee, 2012; Peacock, 1998).

Learning style is one of the important aspects of student diversity and has been an interesting topic for many researchers (Boström & Hallin, 2013; Kharb, Samanta, Jindal, & Singh, 2013; Hawk & Shah, 2007). In fact, various studies were conducted and showed that students' awareness of their learning style may improve academic performance (Magulod, 2018; Barman, Aziz, & Yusoff, 2014; Rogers, 2009). However, studies regarding learning styles are varying and have provoked controversy. Other findings revealed that there is no significant correlation between learning style and achieving learning outcome (Newton & Miah, 2017; Wilson, 2012). Hence, there are researchers who do not actually support the continued use of learning style in educational practice (Willingham, Hughes, & Dobolyi, 2015; Akdemir & Koszalka, 2008).

There are undertakings which revealed that learning style has a positive impact on the academic achievement of learners. However, there are also findings which conclude that learning style does not affect the students' learning performance. Although the application of learning style has been called a myth due to contradictory findings of various researchers, students' preferences for how they learn may make a difference (Deale, 2019; Fleming & Bonwell, 2019).

The VARK is an aspect of learning style which categorizes students based on the different modes of learning preferences. The said preferences classify students as Visual who learn when they see, Aural who learn when they listen, Read/Write who learn when information is displayed in words, and Kinesthetic who learn when they do (Al-Deeb, 2016). Students who have combinations of the latter classification are considered to be Multimodal. In this regard, the concept of VARK is described to be simpler, clearer to use and helpful for understanding learners.

To date, distance learning activities are widely utilized however, there are very limited research studies that explore the relationship of learning activities based on the learning preference of students. Also, most of the previous undertakings conducted on learning materials are related to learning style which is still underutilized because of contradictory evidence of various research. Moreover, previous research conducted focused more on college students and in other disciplines bringing limited literatures in Junior High School students, particularly for Grade 8 taking up Biology. In addition to this, the connection between the learning activities and learning preference of students is not thoroughly examined in the Philippines. The study contributes to the existing limited literature conducted in the country.

1.1 Purpose of the Study

The main purpose of the study is to developed learning activities and determined their effects on the learning of Junior High School students of different learning preferences. Particularly, it answered the following queries:

- What are the learning preferences of Grade 8 Junior High School students in Oro Site High School?
- What learning activities may be developed to enhance the learning of Biology considering the learning preference of students?
- What is the nature of engagement of the students in the different types of activities?
- What are the effects of the developed learning activities on the students' conceptual understanding?

2. Methodology

The descriptive developmental research method was used which involves description, comparison, and interpretation of the data collected focusing on the personal profile of the respondents, particularly their learning preferences. Consequently, learning activities were developed which addressed the learning preferences identified from the respondents. In addition to this, it compared and analyzed the influences of the developed learning activities on the students' nature of engagement and conceptual understanding. The researcher sought permission from the concerned authorities. After its approval, a consent waiver was distributed to the parents of the students which allows their child to become a participant in the undertaking. Consequently, students who agreed to participate were included. In order to maintain confidentiality, a unique alphanumeric code was assigned to each participant in the collection of all the data.

The participants were 35 students in one (1) class of grade 8 at Oro Site High School, Legazpi City. The respondents were still minor, and they were not allowed to visit the school. In this regard, the learning activities and other materials were handed to the participants' parent on the scheduled distribution set by the school for it to be provided to the learners. The VARK Questionnaire was used to profile the learning preference of the students. Students were provided with paper copies of the said questionnaire for them to accomplish. Consequently, the data was submitted to VARK Learn Limited to analyze their scores using the VARK standard algorithm for the identification of the strongest learning preference of the students.

The researcher crafted learning activities. Each set of learning activities entailed a visual, aural, read/write, and kinesthetic activities. The design of the activity was consistent on the characteristics of the different VARK preference. Consequently, the activities were submitted to jurors to validate the materials as provided by the different criteria on the Learning Resource Management and Development System (LRMDS) Assessment and Evaluation (Department of Education, 2009). The jurors come from five (5) different schools who were teaching Science for at least 10 years. The learning materials passed the validation and were administered to the participants. The nature of engagement of the respondents from the learning activities were determined. Information about how they were engaged was procured from their responses on the engagement questions embedded in the Journal Entry Guide. The data were used as the basis to monitor the students.

A pretest/posttest was utilized to determine the conceptual understanding of the students. The test items were submitted to the research adviser and evaluators to validate the questions. Final changes were made after the pilot testing on grade 9 and item analysis to determine the feasibility of the included questions prior on the conduct of a full-scale administration to the intended participants. The final pretest/posttest were administered on grade 8 students before and after they accomplish all the activities, respectively.

2.1 Analysis of Data

The researcher employed appropriate tools for the analysis and interpretation of the data collected. Learning

preference of the students was analyzed using the standard VARK algorithm, which determines the modality that is strongest for a particular person. Their resulting VARK preference were used as the basis on what type of learning activities to develop. Nature of engagement sought how the students were engaged on the different learning activities they performed. The answers of the participants anent nature of engagement were collated to describe and analyze the happenings during the time they perform the developed activities. Mastery Level (ML) percentage of the students was computed for their conceptual understanding which was interpreted based on the Memorandum No. 160 of the Department of Education (2012).

3. Results and Discussion

3.1 Learning Preferences of Grade 8 Students in Oro Site High School

Majority of the participants had a Visual learning preference which constitutes 43% (15) of the total respondents. This was followed by students with Aural preference which composed 23% (8) of the participants. Kinesthetic learners were also present. The 20% (7) of the respondents had a Kinesthetic preference. Also, the students with Read/Write preference constitute 14% (5) of the participants. It was evident that the respondents belong to a heterogenous class of varying learning preferences. According to Mkonto (2015), the learning preferences of students vary because they interact with information differently. Some of the elements that influence this variation on learning preference include physical, personal, emotional, and social factors (Khairy, 2018).

Every student has a unique way of learning and processing information (Gonzales & Reyes, 2016; Gokalp, 2013; Ford & Chen, 2000). Their personal choice to perceive and process information varies. Based on the result, students may learn through seeing, hearing, reading, or doing things. According to Cabual (2021), and Ismaila, Hussain, and Jamaluddin (2010), people naturally have a specific single learning preference that can be different from others. Most of the participants in this study prefer to work with visual information while others are more comfortable with other modes of processing information. It does suggest that teachers should consider varying modality for delivering information to cater the learning preference of the different students. The modality should not be limited on the use of visual or aural, or a combination of visual and aural. It can be bias for the learners who have weak preference on the aforesaid modality and strongly prefer read/write or kinesthetic. Hence, teachers must be mindful of these differences to better address the learning needs of the students.

The pandemic affects the teachers' and students' teaching and learning practice. To make the teaching-learning process meaningful, the role of teacher is inherently important to help all students of various learning preference to learn. In this regard, they must understand learning preference because this can be an important element for e-learning development, delivery, and instruction, which may lead to improved student performance (Shih & Gamon, 2002). Likewise, this may help educators to better design learning materials and keep the student's involvement in doing various learning tasks. Thus, the identified learning preferences of the students were addressed on the learning activities developed by the researcher.

3.2 Learning Activities for Grade 8 Biology Based on Students' Learning Preferences

Biology contains many topics that are difficult to understand for students. Some are abstract concepts and teaching it does not automatically produce understanding. This study determines and design ways to improve the learning of students in Biology. The three (3) topics prioritized for developing the activities were identified to be the perceived difficult topic by students who took up grade 8 Biology, obtained the lowest mastery level from previous assessment test, supported by interview from science teachers, and according to related literatures. The said topics are essential to have an informed decision-making for biology-related problems.

The developed learning activities considered the different VARK learning preferences of the students. In this regard, the researcher made sure that the activities developed had the provision of each of the learning

preferences identified on the sample class. Each topic consists of visual, aural, read/write, and kinesthetic activities that is designed according to its tendency in learning process to cater the different learning preferences of the students (Othmana & Amiruddinb, 2010).

The learning materials were evaluated by five (5) validators. The validators agreed that the three (3) sets of the developed learning activities met all the criteria and it can be used for the study. Hence, the said materials have suitable content for the students' level of development, appropriate format, logical presentation and organization, contains accurate and updated information, and addresses the different learning preference of students. In connection to this, the students were asked to accomplish all the activities so that they were not deprived to learn from other VARK activities. In this manner, it encourages equal opportunity among students who have a particular learning preference to learn from other modalities.

The Learning Activity #1 is about Mitosis and Meiosis. This topic is inherently important to understand growth of organisms, repair of damaged tissues, and reproduction. Background information anent the topic was provided. The activity started by introducing cell cycle and the different events associated thereon, including interphase and cell division. The Visual Activity uses colored representations of the different stages of mitosis and meiosis. Flow chart was utilized to help students determine the process and the different stages of the two (2) types of cell division. Likewise, the Venn diagram allowed the learners to think about the similarities and differences of mitosis and meiosis. Students were also provided with an audio to listen to for the Aural Activity. It dealt with concepts pertaining on cell division. The Read/Write Activity involved rearranging letters and reading of statements that may refer on mitosis or meiosis. On the other hand, Kinesthetic Activity involved hands-on work for making a model representation of the different stages of cell division. Also, materials were provided to the students which allowed them to create and design their own output. At the end of the activity, students were able to cite the significance of cell division and consequences if the said processes fail to function.

The importance of grouping organisms according to shared characteristics was underscored in Learning Activity #2 entitled Hierarchical Taxonomic System. The activity begins with providing background information anent the significance of using scientific names and the eight-level classification system. The Visual Activity utilized diagram to group species according to their taxonomic classification. Different colors and font styles were also used to make it visually appealing. For the Aural Activity, students were provided with a recorded audio. The activity entailed the determining of the most closely related organisms through listening. Also, familiar examples of organisms were used for it to be relatable to students. The Read/Write Activity involved crossword puzzle and reading of statements to get the word being described. Finally, in the Kinesthetic Activity, they were instructed to find particular organisms and utilized the Dichotomous Key to help them identify the class of the organisms. The said activities enabled students to reflect anent the significance of classifying organisms and think logically.

The Learning Activity #3 is about Ecosystem's Cycling of Materials. It deals with the essential cycling processes which include water cycle, oxygen – carbon dioxide cycle, and nitrogen cycle. The activity started by introducing the said processes. Consequently, the Visual Activity allowed the students to show the process for the cycling of materials by labelling the diagram. Likewise, different colors and font styles were used to make it visually appealing. Recorded audio was provided to the students for Aural Activity. The statements for them to think about were repeated twice to clarify ideas. The Read/Write Activity involved reading of paragraphs, describing the processes, and filling in the blanks with the correct word/s. On the other hand, Kinesthetic Activity allowed the students to perform the tasks indicated to name and describe the process that takes place. Also, they based their answers on their observations. At the end of the activity, students were able to cite the significance of the cycling of materials and consequences if materials in the ecosystem do not undergo cycling.

3.3 Nature of Engagement of the Students in the Different Types of Activities

The COVID-19 pandemic causes school closures and the transition to remote learning. This compelled

education sectors to constantly work and sought for alternatives to sustain student learning. Engagement can play a vital role for an effective learning. However, student engagement can be challenging at this time of pandemic because learners seem to have fewer opportunities to be engaged in learning while inside their homes. Likewise, teachers may have difficulties to seek for instructional practices that will engage students in the new normal of teaching. In this regard, it is important to think about strategies that may promote student engagement. Hence, the researcher delved on connecting activities to students' preference hoping to engage learners on distance learning modality.

There are instruments that can be used to qualitatively assess student engagement such as student self-report, teacher report, and observational measures. The researcher utilized the student self-report because this is the most applicable method at this time of pandemic. The said self-report captured the nature of engagement of the students on the different learning activities developed through answering the questions in the Journal Entry Guide. In this manner, learners were able to express themselves and provide insights after accomplishing the activities. The following paragraphs were the nature of engagement of the students on the developed learning activities

Analyzing visual information - According to the learners, performing the visual activity is fun and interesting to do because it consists of pictures and diagrams that help them understand the topic. Overall, the students learn and enjoy this type of activity based on their answers on the journal entry guide. The activity required the students to look at the pictures in answering the learning material. It involves sense of sight to perceive the visual information presented in the activity. However, it is worth to note that the learners do not just look at the pictures. The students examine the visual information presented and analyze its detail while answering the activity as reflected in their journal entry.

Listening to audio-recorded lessons - The students considered the aural activity as challenging and exciting to do. The learners listened carefully to the recorded audio, and the use of familiar examples made them more connected to the task. The students' engagement comes from listening to recorded tasks to learn the concept. The activity involves sense of hearing to perceive the aural information. In this regard, it made the learners listen attentively and replay the recorded audio provided to them to accomplish the activity. It is important to note that being aurally engaged can be attributed for being used on listening to the teacher as they deliver the lesson during the traditional learning set up. This is reflected from the journal of a participant who prefers face to face discussion. For the learners, lack of lectures may reduce their engagement which can result for poor performance (Nepal & Rogerson, 2020; Esposto & Weaver, 2011).

Reading learning materials and solving puzzles - Another task performed by the students was the read/write activity. According to the learners, the said activity was helpful for understanding the terms and concepts. The read/write activity was composed of crossword puzzles, unscrambling of letters, and reading of paragraphs pertaining to the topic. It was described to be interesting as well as a challenging task. The engagement of the learners comes from reading the printed words to answer the learning material. The activity involves sense of sight to perceive the textual or printed information. The learning material permitted the students to try and retry unscrambling letters, as well as eagerly identify the answers through reading to gain knowledge. In this regard, the read/write activity allowed the learners to better understand the topic as reflected on their entry guide.

Performing hands-on activities - The last task that the students performed for every topic is the kinesthetic activity. This activity was considered by the students as fun and exciting to do. It involves making a model representation as hands-on work, accomplishing tasks which involve observation, and performing experiments. The use of real-life applications made them more connected to the task. The students' engagement comes from doing the tasks to learn the concept. The activity involves sense of touch and sight to accomplish and learn from the material. According to Armstrong (2004), this kind of activity allows the learners to move and makes them active. The students cited that the activity made them engage because they design their own output. Likewise,

other tasks in the activity involve movement, particularly in doing the experiment, which helps them discover and remember. Also, the learning activity engaged them to constantly work on the tasks because it helps them to be creative, learn and enjoy hands-on work.

With regards to the abovementioned responses of the students, their engagement on the activity varies. There were forms of engagement by looking at the pictures, listening to a recording, reading concept discussion, and doing tasks which required them to move. It can be observed that the activities involve different senses. The first three (3) tasks, namely, visual, aural, and read activity, were limited on the use of single sense to learn the material provided to them. Looking at the pictures to perceive visual information involves a sense of sight. Listening to a recorded audio requires a sense of hearing. Reading concept discussion to perceived printed words necessitates a sense of sight. On the other hand, doing tasks such as experiments or making a model involves a sense of touch and sight. In this regard, the senses of learners were integrated in the activities they accomplished.

The learning activity stimulates the different senses of the learners. Research has shown that simulations help students to be more involved in learning sessions (Othman & Amiruddin, 2010). As the learner performs the tasks, different senses are triggered and makes retention of learning more effective. This is in line to the Perceptual Learning Theory wherein the VARK learning preference of the students relies on perceptual processes. All actions such as reading, listening, looking, and doing, is guided by perceptual information. Hence, perceiving is an active process. Perceiving seeks information using senses and make use of it rather than passively receiving it (Gibson & Pick, 2000; Gibson, 1988). Based on the journal entry of the learners, the students do not just see, they look to analyze the pictures. Also, learners do not just hear, they listen attentively to understand the topic. Likewise, students do not just read, they comprehend the printed words. Moreover, learners do not just move, they do the tasks to experience and learn.

Students perform and learn using various modalities. In this regard, students strengthen their memory by looking at pictures, listening to recordings, and reading printed words which are considered to be an active learning modality. However, unlike other modalities, kinesthetic activity allows students to be more active. It permits the students to be more actively involved in learning because it requires them to move as an aid for remembering information, which involves more senses. Hence, their engagement shifts from being actively involved towards more actively involved as they perform the visual up to the kinesthetic activity.

It can be noted that the developed activities based on students' learning preferences aroused engagement. Each of the learning activities allows the students to be engaged in a different manner. As the students perform the activities, their engagement shifts from being actively involved towards more actively involved. Being engaged in an activity is beneficial because it makes learning a more enjoyable experience, fosters student commitment, and increases retention of learning (National Commission for Further and Higher Education, 2017). This engagement made the students gauge to accomplish the developed activities and understand the topic.

3.4 Effect of the Developed Learning Activities on the Students' Conceptual Understanding

Conceptual understanding is the ability to make a correct interpretation and connections of ideas or information. To quantitatively determine the extent of conceptual understanding of the students, a multiple-choice pretest and posttest were administered. The said tests covered the six cognitive levels namely remembering, understanding, applying, analyzing, evaluating, and creating. The exam evaluated the students' understanding of the different concepts relative to the learning activities they performed. Likewise, it was used to reveal their ability to assess problems and situations anent the topics. The improvement on students' concept understanding was determined by calculating the Mastery Level (ML) from their pretest and posttest scores. Table 1 shows the effect of the developed learning activities in enhancing the conceptual understanding of the students.

Table 1*Comparison Between the Pretest and Posttest Results of the Students*

Most Essential Learning Competency	No. of Items	Pretest ML (%)	Pretest Interpretation	Posttest ML (%)	Posttest Interpretation	% Increase
1. Compare mitosis and meiosis, and their role in the cell-division cycle.	20	24.00	Low Mastery	62.86	Average Mastery	38.86
2. Classify organisms using the hierarchical taxonomic system.	20	25.86	Low Mastery	66.29	Moving Towards Mastery	40.43
3. Explain how materials cycle in an ecosystem.	20	24.57	Low Mastery	64.29	Average Mastery	39.72
Total	60	24.81	Low Mastery	64.48	Average Mastery	39.67

Note. ML – Mastery Level

The table above suggests that the conceptual understanding of the students was enhanced after performing the learning activities. Initially, the students have Low Mastery (24.81%) of the concepts as reflected in the result of their pretest. Consequently, performing the learning activities allow the respondents to improve their mastery level to Average Mastery (64.48%), which is equivalent to a percentage increase of 39.67%. Also, it can be observed that there is an improvement in the conceptual understanding of the learners in all the competencies. This change in the mastery level of learners indicates that the developed learning activities can promote improvement on their conceptual understanding.

The improvement on the students' conceptual understanding may be brought by the activities they performed. The learning preferences of the respondents were determined to make sure that the preferences identified were catered in the learning activities developed. In connection to this, all the activities were accomplished by the students so that they were not deprived to learn from other material. Also, according to the Brain-Based Learning Theory, a factor in learning which originates in the brain is the sense and senses are perceptual systems. The students were instructed to accomplish all the learning activities because the brain learns more when several senses are stimulated. Students retain information when involving as many senses as possible in the learning process. Likewise, linking many senses allow students to be motivated and help them to sustain interest as they experience different modalities to learn from a learning material (Maqbool, Ismail, Maqbool, & Hassan, 2018).

According to Experiential Learning Theory (ELT), learning is not only based on the cognitive functioning of an individual, but also the result of perceiving information. The learning materials developed were based on the different modalities to perceive information. An individual may perceive or take hold of new information through immersing themselves in concrete reality and relying on senses for grasping experience (Kolb & Kolb, 2013). In ELT, creating opportunities for learners to experience other modalities in learning can be valuable. This is in line with integrated learning where learners have to experience all the learning processes that are responsive to what is being learned. This may create an adaptive flexibility in learning that is positively related to higher levels of development. Individuals with high adaptive flexibility are more self-directed (Sternberg & Zhang, 2001; Kolb, Boyatzis, & Mainemelis, 1999). Likewise, according to Gokalp (2013), students should have exposure to other methods of delivering information because it would allow students to adapt to various learning situations. Hence, all the learning activities were performed by the students.

Considering the numerical and adjectival improvement, the resulting performance level of the learners were still far from the accepted standard of 75%. One factor that may have affected students' conceptual understanding is the complexity level of the topic. Complicated topics make it difficult to grasp and requires more time to develop an understanding (Muijs & Bokhove, 2020). Likewise, it can be linked to poor learning home environment which offer little opportunity to enhance understanding and may not be conducive for students (Essel & Owusu, 2017). Focus of students to learn may be affected because of house chores and other school unrelated activities that may interrupt constant learning. Also, with the adoption of distance learning,

students were not properly monitored and mentored by teachers to clarify and acquire the information they need (Ariaso, 2020; Hako & Shikongo, 2019). In addition to this, it can be associated to minimal/lack of parental involvement to guide learners in accomplishing the learning materials (Michael & Wumi, 2016; Olufemi, Adediran, & Oyediran, 2018). Students were left to do the tasks on their own and were not guided well in accomplishing the activities.

Aside from the abovementioned problems, overwhelming academic workload may also affect students' conceptual understanding because it may bring out stress or other psychological problems on the students. Learning activities for Biology is just one of many materials given to grade 8 students aside from the materials in other subjects. This causes hectic routines for learners which can make them feel overwhelmed or unable to cope when confronted with so many tasks. According to Essel and Owusu (2017), stress can hinder effective learning and may lead to poor academic performance. Despite this, the students still strived to accomplish the different learning activities provided to them, which generally results for an improvement on their conceptual understanding.

The implementation of the developed learning activities brought a change on the students' conceptual understanding. The learning activities utilized various modality to deliver information. It strengthens their memory by looking at pictures, listening to recordings, reading printed words, and doing tasks which require them to move. The learning activities stimulated the different senses of the learners that causes perception, retention, and improvement on their learning. In this regard, it can be inferred that the learners gain knowledge from the activity and improve their understanding.

With the result, one of the areas that may be considered for a successful learning is the development and implementation of activities based on learning preferences. Activities should not be based solely on a single presentation of information but should also consider other modalities (Ariaso, 2020). According to Olufemi et al. (2018), when different learning materials are given to learners, varying experiences may be provided to develop understanding. In addition to this, variation on the way the activities are presented can hamper students' impatience and boredom (Shams & Seitz, 2008). Using many senses may cater to produce more efficient learning.

The students obtained an understanding of concepts through accomplishing the developed activities on the afore-mentioned learning competencies. The result of the pretest and posttest indicates an improvement on the conceptual understanding of the learners. Aside from this, students' learning outcomes were also reflected from their answers in the journal entry guide. Based from their responses, it can be inferred that the students of different learning preferences have learned something after accomplishing the developed learning activities. Some students provided general view on the concepts they understand, whereas others give their reflections by citing significance of the topic on their lives. According to Moran and Keeley (2015), learners have a conceptual understanding when they can think with it, state it in their own words, use it in areas other than what they learned, or make an analogy for it. The said aspects were evident on the responses of the students. Hence, the students of different learning preferences developed conceptual understanding after accomplishing the activities.

4. Conclusion

Based from the findings, the following conclusions were drawn:

- There were four (4) groups of learning preference on grade 8 Junior High School students in Oro Site High School. The said students were found to be visual, aural, read/write, and kinesthetic learners.
- The three (3) most difficult topics in grade 8 Biology were prioritized for developing the learning activities. Each of the topics consist of visual, aural, read/write, and kinesthetic activities. Hence, there were 12 learning activities developed for the three (3) topics in Biology.

- There were forms of engagement by analyzing visual information, listening to audio-recorded lessons, reading learning materials and solving puzzles, and performing hands-on activities. Their engagement shifts from being actively involved towards more actively involved as they perform the visual up to the kinesthetic activity.
- The developed activities stimulated the different senses of the learners that caused improvement on their conceptual understanding.

4.1 Recommendations

Based on the findings and conclusions, the researcher recommends the adoption of the developed learning activities by teachers teaching grade 8 Biology as a supplementary material to the module of students. A set of learning tasks, which consist of V-A-R-K activities, may be implemented instead of giving a particular type of activity on a learner. Also, it is recommended to develop other supplementary activities tailored to the learning preference of the students for them to be engaged and improve their learning. Trainings/ seminars for science teachers may be conducted to help them better design and developed activities based on students' learning preferences. Further studies may be conducted in line with the present undertaking using control and experimental groups of students to have a basis for comparison regarding the effect of learning activities based on students' learning preferences.

5. References

- Akdemir, O., & Koszalka, T. A. (2008). Investigating the relationships among instructional strategies and learning styles in online environments. *Computers and Education*, 50, 1451-1461. <https://doi.org/10.1016/j.compedu.2007.01.004>
- Al-Deeb, N. R. (2016). Matching learning styles with teaching strategies. *KSAALT TESOL Journal*. Retrieved from <https://www.scribd.com/document/522810596/Matching-Learning-Styles-With-Teaching-Strategies-ALDEEB-N-May-2016>
- Ariaso, R. N. (2020). Factors of learning in Filipino and students' performance of secondary education in Eastern Visayas Philippines. *Palarch's Journal of Archaeology of Egypt/Egyptology*, 17(6).
- Armstrong, A. M. (2004). *Instructional design in the real world: A view from the trenches*. United States: Information Science Publishing.
- Barman, A., Aziz, R., & Yusoff, Y. (2014). Learning style awareness and academic performance of students. *South East Asian Journal of Medical Education*, 8(1). Retrieved from http://seajme.md.chula.ac.th/articleVol8No1/8_OR3_ArunodayaBarman.pdf
- Boström, L., & Hallin, K. (2013). Learning style differences between nursing and teaching students in Sweden: A comparative study. *International Journal of Higher Education*, 2,(1). <https://doi.org/10.5430/ijhe.v2n1p22>
- Cabual, R. A. (2021). Learning styles and preferred learning modalities in the new normal. *Open Access Library Journal*, 8, e7305. <https://doi.org/10.4236/oalib.1107305>
- Chanseawrassamee, S. (2012). Teaching adult learners English through a variety of activities: Perception on games and rewards. *US-China Foreign Language*, 10(7), 1355-1374
- Deale, C. S. (2019). Learning preferences instead of learning styles: A case study of hospitality management students' perceptions of how they learn best and implications for teaching and learning. *International Journal for the Scholarship of Teaching and Learning*, 13(2). <https://doi.org/10.20429/ijstl.2019.130211>
- Department of Education. (2012). *Maximizing utilization of the national achievement test (nat) results to raise the achievement levels in low performing schools: Memorandum No. 160*. Philippines.
- Department of Education. (2009). *Guidelines and processes for lrmds assessment & evaluation*. Philippines.
- Esposito, A. S., & Weaver, D. (2011). Continuous team assessment to improve student engagement and active learning. *Journal of University Teaching & Learning Practice*, 8,(1), 97-108.

- <https://doi.org/10.53761/1.8.1.8>
- Essel, G., & Owusu, P. (2017). Causes of students' stress, its effects on their academic success, and stress management by students. *Seinäjoki University of Applied Sciences*. Retrieved from https://www.academia.edu/34566514/Causes_of_students_stress_its_effects_on_their_academic_success_and_stress_management_by_students
- Fleming, N. D., & Bonwell, C. (2019). *How do I learn best? A student's guide to improved learning*. Retrieved from <https://vark-learn.com/wp-content/uploads/2019/07/How-Do-I-Learn-Best-Sample.pdf>
- Ford, N., & Chen, S. (2000). Individual differences, hypermedia, navigation, and learning: An empirical study. *Journal of Educational Multimedia and Hypermedia*, 9, 281-311.
- Gibson, E. J. (1988). Exploratory behavior in the development of perceiving, acting, and the acquiring of knowledge. *Annual Review of Psychology*, 39, 1-41. <https://doi.org/10.1146/annurev.ps.39.020188.000245>
- Gibson, E. J., & Pick, A. D. (2000). An ecological approach to perceptual learning and development. New York: Oxford University Press.
- Gokalp, M. (2013). The effect of students' learning styles to their academic success. *Scientific Research*, 4(10), 627-632. <https://doi.org/10.4236/ce.2013.410090>
- Gonzales, M. V., & Reyes, P. B. (2016). Academic performance and learning styles of liberal arts students in physical science. *Asia Pacific Journal of Education, Arts and Sciences*, 3(3), 28-35. Retrieved from <http://oaji.net/pdf.html?n=2016/1710-1475121440.pdf>
- Hako, A. N., & Shikongo, P. T. (2019). Factors hindering students from completion of studies within the prescribed duration: A case study of the Public University in Namibia. *Journal of International Society for Teacher Education*, 23(1).
- Hawk, T. F., & Shah, A. J. (2007). Using learning style instruments to enhance student learning. *Decision Sciences Journal of Innovative Education*, 5(1), 1-19. <https://doi.org/10.1111/j.1540-4609.2007.00125.x>
- Ismaila, A., Hussain, R. M. R., & Jamaluddin, S. (2010). Assessment of students' learning styles preferences in the faculty of science, Tishreen University, Syria. *Procedia Social and Behavioral Sciences*, 2, 4087-4091. <https://doi.org/10.1016/j.sbspro.2010.03.645>
- Khairy, H. A. (2018). Investigating factors affecting learning styles preferences of hospitality management program (hmp) students. *Journal of the Faculty of Tourism and Hotels*, 15(1). <https://doi.org/10.21608/thalexu.2018.51475>
- Kharb, P., Samanta, P. P., Jindal, M., & Singh, V. (2013). The learning styles and the preferred teaching-learning strategies of first year medical students. *Journal of Clinical and Diagnostic Research*, 7(6), 1089-1092. <https://doi.org/10.7860/JCDR/2013/5809.3090>
- Kolb, A. Y., & Kolb, D. A. (2013). *The kolb learning style inventory: A comprehensive guide to the theory, psychometrics, research on validity and educational applications*. Experience Based Learning Systems.
- Kolb, D. A., Boyatzis, R. E., & Mainemelis, C. (1999). Experiential learning theory: Previous research and new directions. Retrieved from https://www.researchgate.net/publication/284458870_Experiential_Learning_Theory_Previous_Research_and_New_Directions_in_in_Perspectives_on_Thinking_Learning_and_Cognitive_Styles
- Magulod, G. C. (2018). Learning styles, study habits and academic performance of Filipino university students in applied science courses: Implications for instruction. *Journal of Technology and Science Education*, 9(2), 184-198. <https://doi.org/10.3926/jotse.504>
- Maqbool, S., Ismail, S. A. M. B. M., Maqbool, S., & Hassan, S. U. (2018). Effects of traditional lecture method and multi-sensory approach on elt learners at graduate level. *International Journal of Academic Research in Progressive Education and Development*, 7(4), 488-505. <https://doi.org/10.6007/IJARPED/v7-i4/5476>
- Michael, I. O., & Wumi, O. A. (2016). Causes and remedies to low academic performance of students in public secondary schools: A study of ijero local government area of Ekiti State. *Research on Humanities and Social Sciences*, 6(15). Retrieved from <https://core.ac.uk/download/pdf/234675274.pdf>
- Mkonto, N. (2015). Students' learning preferences. *Journal of Studies in Education*, 5(3).

- <https://doi.org/10.5296/jse.v5i3.8125>
- Moran, R. K., & Keeley, P. (2015). *Teaching for conceptual understanding in science*. United States of America: National Science Teachers Association Press.
- Muijs, D., & Bokhove, C. (2020). *Metacognition and self-regulation: Evidence review*. London: Education Endowment Foundation.
- National Commission for Further and Higher Education. (2017). *Student engagement in school life and learning*. Malta Life Sciences Park, San Gwann, Malta.
- Nepal, R., & Rogerson, A. M. (2020). From theory to practice of promoting student engagement in business and law-related disciplines: The case of undergraduate economics education. *Education Science, 10*(8), 1-13. <https://doi.org/10.3390/educsci10080205>
- Newton, P. M., & Miah, M. (2017). Evidence-based higher education – Is the learning styles ‘myth’ important? *Frontiers in Psychology, 8*. <https://doi.org/10.3389/fpsyg.2017.00444>
- Olufemi, O. T., Adediran, A. A., & Oyediran, W. O. (2018). Factors affecting students’ academic performance in colleges of education in Southwest, Nigeria. *British Journal of Education, 6*(10), 43-56. Retrieved from <https://www.eajournals.org/wp-content/uploads/Factors-Affecting-Students%E2%80%99-Academic-Performance-in-Colleges-of-Education-in-Southwest-Nigeria.pdf>
- Othman, N., & Amiruddin, M. H. (2010). Different perspectives of learning styles from vark model. *Procedia Social and Behavioral Sciences, 7*(C), 652–660. <https://doi.org/10.1016/j.sbspro.2010.10.088>
- Peacock, M. (1998). Exploring the gap between teachers’ and learners’ beliefs about ‘useful’ activities for efl. *International Journal of Applied Linguistics, 8*(2), 233-248. <https://doi.org/10.1111/j.1473-4192.1998.tb00131.x>
- Rogers, K. M. A. (2009). A preliminary investigation and analysis of student learning style preferences in further and higher education. *Journal of Further and Higher Education, 33*(1), 13-21. <https://doi.org/10.1080/03098770802638234>
- Shams, L., & Seitz, A. R. (2008). Benefits of multisensory learning. *Trends in Cognitive Sciences, 30*(10). <https://doi.org/10.1016/j.tics.2008.07.006>
- Shih, C., & Gamon, J. (2002). Relationships among learning strategies, patterns, styles, & achievement in web-based courses. *Journal of Agricultural Education, 43*, 1-11. <http://pubs.aged.tamu.edu/jae/pdf/Vol43/43-04-01.pdf>
- Sternberg, R. J., & Zhang, L. F. (2001). *Perspectives on thinking, learning, and cognitive styles*. NJ: Lawrence Erlbaum.
- Willingham, D. T., Hughes, E. M., & Dobolyi, D. G. (2015). The scientific status of learning style theories. *Society for the Teaching of Psychology, 42*(3), 266-271. <https://doi.org/10.1177/0098628315589505>
- Wilson, M. (2012). Students’ learning style preferences and teachers’ instructional strategies: Correlations between matched styles and academic achievement. *SRATE Journal, 22*(1).
- Zhu, D. (2012). Using games to improve students’ communicative ability. *Journal of Language Teaching and Research, 3*(4), 801-805. <https://doi.org/10.4304/jltr.3.4.801-805>