Development And Assessment Of Self-Paced Module For Grade 7 Science Cum Worksheets

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Abstract: Biology is one of the core subjects in the K to 12 Curriculum. This study endeavored to assess the use of Strategic Intervention Material as a tool in remediating Grade 7 Biology least learned competencies in San Felipe Integrated School. It also sought to find out the least learned competencies based from the second quarter test result in biology class and describe the extent of the mastery of 75 respondents after the use of SIM as an intervention.

As revealed in the study, based on the second quarter test result, respondents possess the minimum knowledge about identifying beneficial and harmful organisms such as fungi, protists and bacteria, relationship of animal to the surroundings, biotic and abiotic factor of the ecosystem, difference of asexual and sexual reproduction, and the components of plant and animal cells.

The result of mastery level per learning competencies using the verbal descriptions of each attained percentage and cumulative percent. In the first competency, most of the respondents fell within "moving towards mastery" but one of them was described as "low mastery" after remediation. In the second competency, most of the respondents were at the range of "moving towards mastery", in the third competency, students were categorized as having "average mastery" after the remediation. While in the fourth and fifth competency, most of the students were described as having "average mastery" while there are three students with "absolutely no mastery". There were noted factors of difficulties of respondents in learning the competencies.

It is recommended that teachers find time in making strategic intervention materials to help learners study the topics, lessons or difficulties during their vacant time, holidays, when typhoon occurs, suspension of classes and when they are at home, make a progress chart for each students as reference for their improvement, and the conduct of similar studies is recommended with consideration for localized materials, three domains of learning, and higher order thinking skills.

Keywords: *curriculum, item analysis, module, self-assessment, mastery of learning*

1. Introduction

In this globally competitive world, education plays a significant role in every individual's life. Through education a person is equipped with the necessary knowledge, attitude and skills needed for life-long learning. According to Suba (2010), learning is a process wherein an idea is acquired in different ways. Learning requires concept formation and mental construction of knowledge into concept systems.

To make the learning always available in all learners, new strategies, techniques and methods are advised to teacher in order that the teacher cope up with the present trend of computer generated learners. The focus of K-12 Curriculum is to have a student centered approach in all schools at all times. They encourage teachers to use inquiry-based approach, constructivist approach, integrative and collaborative

method of teaching as a strategy to meet the desired goal of DepEd Curriculum (deped.resources, 2015).

However, school days these past few years were loaded with so many activities and concerns. There are also yearly holidays that teachers observed every month that they need to follow. Aside from this, teachers are required to attend different seminars to upgrade their knowledge and be updated in all new regulations and memoranda to follow. Learners were also trained in different subjects to be the contestants in quiz bee contests, sports meet, school camping, etc. Due to these reasons, the desired learning competencies cannot be mastered in a short period of time. There is not enough time to teach the other competencies in just few days.

Moreover, learners have poor performance in Science based from the mean percentage score of the last quarter. Learners in this generation are more addicted to gadgets, mobile games and social media. Learning difficulties may be attributed to different factors like the environment, technology, peers, parents and even the school. Structure of the school with limited resources and learning materials can affect the learning needs of the students. Distance of school from home of the learners may also a factor to cope learnings. This is the reason why the researcher was encouraged to make a Strategic Intervention Material in Grade 8 Biology subject. The purpose is not only to help the students to keep up with the lesson but also to help them to learn and remediate the learning competencies.

Biology subject is a major subject that focuses on the discussions and experimentation taught in sixty minutes (one hour). The teacher should be flexible to facilitate the learning to ensure that learners will understand the lesson in a few days. In addition, some of the learning competencies are pre-requisite knowledge to understand the learning competency in the next grade level. If the teacher fails to teach other competencies, students will lack the knowledge to answer formative, summative and quarterly test. Thus, the performance level of students will be low.

Based from the research of Kamamia et al., (2014), mastery of subject matter is an essential skill that a teacher requires to be endowed with for it has a direct impact in teaching and learning process in schools. The learner gets maximum benefit from teacher-learner relationship that is based on teacher's competence in the delivery of subject content.

Therefore, in order that the Grade 8 students will have the mastery of the learning competencies, the researcher thought of ways to help them and one way is by providing SIMs. According to Suba (2010), it is an effective means of instruction because it is a self-paced, independent learning materials that provide learnings for immediate reinforcement of correct responses.

According to Vega et al., (2009) Strategic intervention material is an instructional material meant to reteach the concept and skills. It is a tool given to learners to help them master a competency-based skill which they were not able to develop during the regular classroom teaching with minimal intervention or guide of the teacher.

Through the use of SIMs, students will learn best especially when they discover answer for questions and problems themselves. They will learn to find their own goals and be given choices as to what and how to learn. Students learn most effectively when they feel to be a part of the intervention such as understanding on the concepts, interactive topics and discussions with summative test at the end. If the teacher provides SIM, it will serve as supplementary material to the current K to 12 resources where contextualization is a top priority (lrmds.portal, 2012).

Moreover, the study of Anderson (2012) revealed that using intervention material had assisted the learners of Biology to improve their performance in understanding the concepts of photosynthesis, respiration, mendelian, non-mendelian genetics etc. He uses of computer-based materials and exercises on concept mapping allowed these students to improve their performance significantly in answering and understanding genetic problems and concepts. Finally, Escoreal (2012) found that the use of SIM reduced the number of least mastered skills after the implementation of the intervention material in Grade 4 Science. He particularly emphasized that SIMs must be implemented to avoid pupils' marginalization. Proving that students can cope with science lessons with the teacher utilization and integration of intervention materials.

Students learned much from the intervention material or self-learning material and can work with it. They had ease receiving the instruction, interested and motivated to learn the subject, and gained significant learning using the material.

According to Vega, Prieto, and Carreon (2009), "each individual must be equipped to seize learning opportunities throughout life, both to broaden knowledge, skills and attitudes, and adapt to a changing, complex and interdependent world.

The quality of student's performance remains to be the top priority of every academic institution. Aside from the National Achievement Test administered by the government, private schools seek the help of privately operated organizations such as the Center for Educational Measurement (CEM). According to its official website, CEM achievement tests are designed to measure academic stability and achievement of students in English, Reading/ Pagbasa, Mathematics, Science, Araling Panlipunan, and Filipino.

Biology as a Subject

According to Geleta et al., (2008), biology is one of the elective subjects in the Key Learning Area (KLA) of Science Education. The Biology Curriculum serves as a continuation of the Science (S1-3) curriculum and builds on the strength of current Biology curricula. It will provide a range of balanced learning experiences through which students develop the necessary scientific knowledge and understanding, skills and processes, values and attitudes embedded in the "Life and Living" strand and other strands of science education for personal development and for contributing towards a scientific and technological world. The curriculum will prepare students for entering tertiary courses, vocation-related courses or the workforce in various fields of life science.

In order that the teacher will help the learners to deepen their understanding in learning competencies or lessons to be taught, according to Renard et al., (2016), learning competencies should give focus because today, learning happens in a classroom, with a lots of other students. The teacher teaches a lesson and goes on the next one. If a student can't master the lesson or learning material, there are many ways schools try to support those students to catch up. But since every student is more or less on the same time schedule, there are only few things you can do. At some point, you have to move on the next topic. Those that were not able to catch up, will struggle more and more, and eventually fall so far behind that it becomes impossible to catch up.

Mastery of Learning

According to Renard et al., (2016), mastery of learning aims to change that, primarily by letting go of the concept that everyone is on the same time schedule. It requires more differentiated learning, giving students more time to go over the learning material, giving them extra explanation and support. And he would also eventually master the learning material, just like anybody else. He also added that mastery of learning focuses on mastering a topic before you move on to an more advanced one. The mastery approach suggests that every student is on his own track. Education would have to be personalized and learners would have private tutors and different worksheets for every learner. It sounds really new and impractical, but the truth is that, 100 years ago, there already experiments where they did mastery-based learning and saw great results. They also said it would never scale because it was logistically difficult and impractical.

When student needs to practice and get feedback, teachers can use adaptive exercises like book widgets, modules, and self-learning material. Because of providing learning materials, students can finally master the concepts while building a growth mindset, grift, and taking agency over their learning. Students do not have to focus anymore on the lecture. They can now interact with each other and get a deeper mastery over the material.

K-12 Science Curriculum

According to the Department of Education, the K to 12 science curriculum will provide learners with a repertoire of competencies important in the world of work and in a knowledge-based society. It envisions the development of scientifically, technologically, and environmentally literate and productive members of society who are critical problem solvers, responsible stewards of nature, innovative and creative citizens, informed decision makers, and effective communicators. This curriculum is designed around the three domains of learning science: understanding and applying scientific knowledge in local setting as well as global context whenever possible, performing scientific processes and skills, and developing and demonstrating scientific attitudes and values. The acquisition of these domains is facilitated using the

following approaches: multi/interdisciplinary approach, science technology-society approach, contextual learning, problem/issue-based learning, and inquiry-based approach. The approaches are based on sound educational pedagogy namely, constructivism, social cognition learning model, learning style theory, and brain-based learning.

Science content and science processes are intertwined in the K to 12 Curriculum. Without the content, learners will have difficulty utilizing science process skills since these processes are best learned in context. Organizing the curriculum around situations and problems that challenge and arouse learners' curiosity motivates them to learn and appreciate science as relevant and useful. Rather than relying solely on textbooks, varied hands-on, minds-on, and hearts-on activities will be used to develop learners' interest and let them become active learners.

As a whole, the K to 12 science curriculum is learner-centered and inquiry-based, emphasizing the use of evidence in constructing explanations. Concepts and skills in Life Sciences, Physics, Chemistry, and Earth Sciences are presented with increasing levels of complexity from one grade level to another in spiral progression, thus paving the way to a deeper understanding of core concepts. The integration across science topics and other disciplines will lead to a meaningful understanding of concepts and its application to real-life situations.

Features of K-12 Curriculum in Preparing Learners' Materials

According to DepEd Order No. 42 s. 2016, in preparing daily lesson plans, teacher's learning materials are encouraged to emphasize the feature of K to 12 Curriculum which are spiral progression, constructivism, differentiated instruction, and contextualization.

The K to 12 curriculum follows a spiral progression of content. This means that students learn concept while they are young and learn the same concepts repeatedly at a high degree of complexity as they move from one grade level to another. According to Bruner (1966) this helps the learners to organize their knowledge, connect what they know and master it. Teachers should make sure that in preparing the SIM, learners are able to revisit previously encountered topics with an increasing level of complexity and that lessons build on previous learning.

The K to 12 curriculum views learners as active constructors of knowledge. This means that in planning lessons, and creating instructional materials and intervention materials teacher should provide learners with opportunities to organize or re-organize their thinking and construct knowledge that is meaningful to them. This can be done by ensuring that lessons engage and challenge learners and tap into the learners' zone of proximal development (ZPD) or the distance between the learners' actual development level and the level of potent development. Vygotsky (1978) suggests that to do this, teachers can employ strategies and provide self-learning materials that allows collaboration among learners so that learners are varying skills can benefit from interaction with one another.

All K to 12 teachers are encouraged to differentiate their teaching in order to help different kinds of learners meet the outcomes expected in each lesson. Differentiation or differentiated instructional materials provide multiple learning opt the classroom so that learners of varying interests, abilities, and needs are able to take in the same content appropriate to their needs.

Section 5 of RA 10533 or the Enhanced Basic Education Act of 2013 states that the K to 12 Curriculum shall be learner-centered, inclusive and developmentally appropriate, relevant, responsive, research-based, culture sensitive, contextually global, and flexible enough to allow schools to localize, indigenize, and enhance the same based on their respective educational and social contests. K to 12 teachers are allowed to use contextualized strategy and materials in their lessons for improving academic performance and mastering it.

Self- directed Learning

According to Skiff and Hetzel (2008), self-directed learning describes a process by which individuals take the initiative, with or without the assistance of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes. According to Knowles (1975) in self- directed learning, learner takes the initiative to pursue a learning experience, and the

responsibility for completing their learning. Once the initiative is taken, the learner assumes complete responsibility and accountability for defining the learning experience and following it through to its conclusion. This does not preclude input from others, but the final decision is the learner's decision. Self-direction does not mean the learner learns alone or in isolation. While, that may be the case in any given learning situation, the critical factor here, again, is the fact the learner is driving the total learning experience, beginning with recognizing a need to learn.

Strategic Intervention Material as a tool in Biology

The Department of Education employs a solution for the deteriorating academic performance of students in the field of science and technology. As stipulated in the DepEd Order no. 39, s. 2012, interventions have to be made in order to address learning gaps. The use of Strategic Intervention Material (SIM), is identified as one of the suggested various intervention form that can bridge learning gaps. SIM is a remediation aid for the students at the level of their understanding and thereby increasing their academic achievement.

SIM was defined by Bunagan (2012) as meant to re-teach the concepts and least mastered skills, and in this study the science concepts and skills. It is a material given to students to aid in mastering the competency-based skills which they were not able to develop in regular classroom instructions. SIM is a multifaceted approach to aid the students, especially those who are non-performing to become independent and successful learners.

SIM increases and deepens students' skills in manipulation, knowledge or thinking, understanding, and observing the microscopic into macroscopic representation of cell like atoms, molecules, and ions which students believe as a vague symbolism of what they know about biology and other related concepts in science. SIM is an instructional material that is prescribed by the Department of Education to increase the level of proficiency of students in science subjects.

According to Dacumos (2015), the crafting of these tools have been intensified through the conduct of division, regional, and national competitions for SIM making and part of the teacher's innovation for ranking purposes. However, it is through this same activity that SIMs have been used for levelling up the achievement in Science of the learners, rather for personal pursuit. But regardless, in preparing this tool, science educators are encountered by another predicament, that is in the selection and development of assessment methods in crafting science SIMs, which are appropriate, suitable and strategically-designed for students' learning. Assessments in SIMs include a variety of methods that allow students to demonstrate evidence of learning such as performance of tasks and applying to real-life situations. Gone are the days that assessments are confined to paper and pencil, thus, authentic assessments have to be encouraged in the making of SIMs.

An instructional intervention is a specific program or set of steps to help a child improve in an area of need. According to Enriquez (2007), the Filipino seems to be the most effective when he is exposed to a material as a meaningful whole. While he appreciates parts, he tackles them simultaneously or sequentially. He does this not according to an inflexible and pre-conceived plan but according to the most efficient combination of interaction between the exigencies of the situation and the changing demands of the active-self. The Filipino would rather control his schedule than allow himself to become compulsive victim of the imposed structure.

Effectiveness of Self-directed Learning

Another result from Manipal University research about "The effectiveness of self- directed learning (SDL) and the Traditional Lecture" by Pai, Rao, and Punja (2007), they found out that in the first topic, Batch A students, who were exposed to an independent SDL session, scored similar to Batch B, who were supplemented with a lecture to SDL. This suggests that the additional lecture delivered to one batch of students failed to make SDL session more effective for learning the topic. There was no significant difference in the number of students with high, medium, or low scores between the two groups. Hence, the different learning methods employed did not influence different levels of scores between the two groups.

Therefore, it was concluded that, SDL can be considered as an alternate form of learning in knowledge acquisition. As SDL was equally effective as lecture, it is not necessary to supplement one instructional approach with the other. However, in

this study, SDL sessions could cover only few topics area from the total content needs to be done to ascertain the impact of SDL on science curriculum and level of mastery of science class.

Some researchers have highlighted the motivational component of self-directed learning, arguing that this kind of learning is effective because it makes students more willing and more motivated to learn. But few researchers have examined how self-directed learning might influence cognitive processes, such as those involved in attention and memory.

In an article published in Perspectives on Psychological Science, a journal of the Association for Psychological Science, researcher Gureckis and Markant of New York University (2008) address this gaps in understanding by examining the issue of SDL from a cognitive and a computational perspective. According to them, research from cognition offers several explanations that help to account for the advantages of self-directed learning. For example, SDL helps us optimize our educational experience, allowing us to focus effort on useful information that we do not already possess and exposing us to information that we do not have access to through passive observation. The active nature of SDL also helps us in encoding information and retaining it over time. But we are not always optimal self-directed learners.

Drawing together, research from cognitive and computational perspectives will provide researchers with a better understanding of the processes that underlie SDL and can help bridge the gap between basic cognitive research and applied educational research. Hope that this integration will help researchers to develop assistive training methods that can be used to tailor learning experiences that account for the specific demands of the situation and characteristics of the individual learner.

Learning difficulties against science curriculum

According to Geleta et al., (2008), in order students will develop their necessary scientific knowledge and understanding, skills and processes, values and attitudes in science curricula, strands in science education will be strengthen and developed to prepare students towards a scientific and technological world.

In addition, the teacher will help learners to deepen their understanding in learning competencies or lessons to be taught, according to Renard et al., (2017), learning competencies should give focus because today, learning happens in a classroom, with a lots of other students. The teacher teaches a lesson and goes on the next one. If a student can't master the lesson or learning material, there are many ways schools try to support those students to catch up.

Isaacson et al., (2016) agrees that providing accessible science learning activities may help to increase both the number of individuals who have learning difficulties and the adoptability and diversity of science learning. Rosenkranzer et al., (2016) added that the understanding of complex, dynamic and animate systems has a special standing in education for the sustainable development and biology. Hudson (2016) concluded in their study that teacher must provide an overview of the strengths and weaknesses of the students, as well as practical suggestions for modifying teaching materials and methods to make learning enjoyable, effective and accessible for all learners.

Moreover, students have learning difficulties each topic in every quarter. Maybe of the reason that, in Self-Regulation Theory of Bandura cited by McClendon (2002), self-learning influences the level of goal challenge people set for themselves, the amount of effort they mobilize, and their persistence in the face of difficulties. It means that self-learning influences the performance accomplishments over self-set goals.

Westwood (2016), learning difficulties provides guidance on teaching students that encounter difficulties in number of learning areas including science. He used a cross-curricular perspective, he suggested this as the best strategies for reducing learning failure and enhancing student's progress. Fried (2012) added a practice of experiential pedagogy like using of strategic intervention material address student's learning. She believed that experiential pedagogy engages students' knowledge construction and helps students to learn holistically.

Bahar et al., (2007) suggest that students perceived science subject as difficult, there are level of abstractness in science concepts, teacher's assessment in the curriculum or the type of exam administered by the teacher.

Classroom and learning disabilities through instruction of science may contribute the difficulty in learning. Bulat et al., (2017) concluded that having

learning disability can be one of the most marginalizing factors in child's life and education. Disabilities can be challenging especially in school moreover when there are severely limited resources.

According to the study conducted by Escoreal (2012), he concluded that the use of SIM reduced the number of least learned skills. He emphasized that SIM avoids student's marginalization and utilized students to cope science lessons. Renard et al., (2017) added the SIM provides students to master the concepts with deeper mastery over the material.

However, there are some instances that learners are confined in what they know, Enriquez (2007) opposed this in which he suggested that intervention material is the most efficient of combination of interaction between exigencies of the situation and which learners changing demands of the active self.

Emotional factor may one of the reasons where nine respondents fell in average and low mastery. Meyer et al., (2008), found that the students who adopted a deep approach in learning were very likely to pass the course, while students who adopted a surface approach were very likely to fail. The students who adopted a deep approach also generally expressed greater satisfaction with their instruction.

According to Kendra (2014), this happens when a student fails to focus on what is being taught. Maybe they had other things in their mind that day or the material simply was not engaging enough to capture their attention. Another reason for not paying attention is that the student didn't see a reason for learning this information; it didn't seem to have a purpose related to the subject at hand. There is an encoding failure which may also occur when too much information all at once, causing them to have to pick and choose what the brain will retain.

However, the study of Ibe cited by Martin (2009) shows that majority of students are poor in sentence analysis. Another reason in which a respondent may fail and not mastered the competency well is supported by Sigamony (2014), he reveals that if the students do not analyze a lesson he or she fails to grasp a concept to pre-knowledge and their existing knowledge structures which militate against any kind of understanding.

2. Goals and aims of the present study

This study aimed to assess the use of Strategic Intervention Materials (SIMs) as a tool in remediating Grade 7 Biology least learned competencies in San Felipe Integrated School. Specifically, it sought to answer the following questions:

1. What are the least learned competencies based from the Second Quarter test result in Grade 7 Biology class?
2. How may the extent of the mastery of five least learned competencies be described after the use of SIM as an intervention?

3. Methods

Through the use of SIMs learners can master their least learned competencies and teachers will help students to learn by their own. Through SIMs utilization learners are assisted in achieving success in concept mastery. Thus, using learning or intervention materials performance level on the competencies will be improved, developed and mastered.

Among the various systems of individualized instruction proposals, modular instruction is one of the newest and it combines many advantages of a number of separate instructional innovations, such as performance objectives, self-pacing, and frequent feedback.

Bruner's Cognitive Learning Theory (1966) concluded that learning is an active process in which learners construct new ideas or concepts upon their current or past knowledge. He also added that the learner selects and transforms information, construct hypotheses, and make decisions, relying on a cognitive structure to do so. Cognitive structure provides meaning and organization to experiences and allows the individual to "go beyond the information given".

This research entails how SIMs described mastery level of students after the utilization of SIMs. After the second quarter test, students are described with their least learned competencies. Bruner emphasized that learners will construct new ideas when they are given information and meaningful experiences. Thus, after researcher selected five least learned competencies he designed a SIMs to remediate students' least learned competencies. This gives a clue to support minimal knowledge of students in Biology subject. Relying on a cognitive structure and information given, students developed their

mastery level. This will become meaningful because the intervention materials are self-pacing, performance objective and self-directed.

Corollary, the current study could be best presented and analyzed using the Context, Input, Process and Product (CIPP) Model which was developed by Daniel Stufflebeam in 1960's. Figure 1 depicts the flow of the study using the CIPP Model.

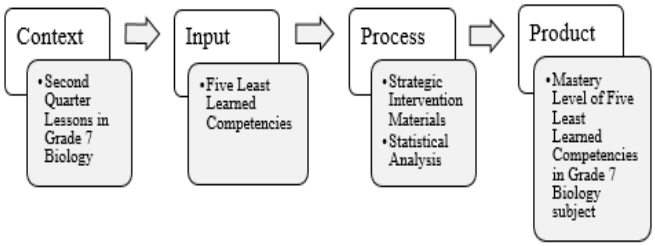

Figure 1. Paradigm of the study using the CIPP Model

From the context of testing from second quarter lessons in Grade 7 Biology there are inputs of five least learned competencies. In the CIPP Model, these five least learned competencies are containing of the Strategic Intervention Material which is part of the process and the resulting outcome is an improved level of five least learned competencies in Grade 7 Biology subject.

In order to gather the desired results, the descriptive research method is employed. It includes studies presenting the facts concerning the nature and status of anything. This means that it gives meaning to the quality and standing of facts that are going on.

Three main purposes of research are: to identify the least learned competencies based from the Second Quarter test result in Grade 7 Biology class, to describe the mastery level of Grade 8 least learned competencies after the use of SIMs as an intervention.

Descriptive research generally precedes explanatory research. According to Jackson (2009) it aims at casting light on current issues or problems through a process of data collection that enables them to describe the situation more completely.

The researcher used and designed intervention materials which are the SIMs as a tool in describing the Grade 7 students in remediating their learning competencies in Biology.

Research Instruments

The instrument used in this study are the Second Quarter Test in Grade 7 Biology as the basis for identifying five least learned competencies. The researcher did an item analysis using the table of specification. After identifying the ten least learned competencies, the researcher identified the five topics of the least learned competencies which is the basis in construction of the strategic intervention material. The number of test items was derived after the item analysis and the type of test to assess the learning of respondents are presented below which is derived from the topics of every learning competency.

Table 1. Number of Test Items each competency

Competencies	Number of Test Items	Type of Test
1	15	Multiple Choice
2	10	Multiple Choice
3	10	Multiple Choice
4	10	Multiple Choice
5	5	Multiple Choice
Total	**50**	

To assess the learning competencies each topics has corresponding computations of number of items. Rank 1 in the least learned competencies has more items and is definitely the difficulty of the learners on the subject, and a decreasing computations until Rank 5.

To identify the level of mastery of students after the SIM administration from the assessment in each learning competencies the researcher adopted the Policy Guidelines on Classroom Assessment for the K to 12 Basic Education Program on DepEd Order no. 8 s. 2015 standard grading system for quarterly assessment illustrated below;

$$\text{Percentage Score for Quarterly Assessment} = \frac{\text{Raw Score}}{\text{Highest Possible Score}} \times 100$$

According to DepEd Memorandum no. 160 series of 2012, to determine the quality learning outcomes from the assessment results or any descriptive equivalent after data utilization including the use of intervention and remedial instruction, such mastery or achievement level are specified. Thus, the researcher followed the rating scale for determining mastery level of Grade 7 after the utilization of SIMs, remediation and assessment.

To describe each learning competency, descriptions below and each calculated percentage used;

Description of MPS each learning competency Based on Test Results

Percentage	Descriptive Equivalent
96-100	Mastered
86-95	Nearly Mastered
66-85	Moving Towards Mastery
35-65	Average Mastery
16-34	Low Mastery
5-15	Very Low Mastery
0-4	Absolutely No Mastery

Strategic intervention material is the main tool in this study. This material was validated by the English teacher, school principal, and Chairman of School Evaluation Team. It is composed of five parts which include; Title card, Guide card, Activity card, Assessment card, and Reference card. SIMs was aligned with the Second Quarter least learned competencies identified after the Second Periodical Examination. Afterwards, SIMs was given to the identified respondents and they are tasked to answer the activities within five days. The researcher checked the activities on the activity card and assessment card before giving the assessment or least learned test.

Statistical tool

Descriptive statistics was used in the study. The process of the study was illustrated using the CIPP Model. After the examination of second quarter, frequency of the correct answer per item number are counted for the formulation of the item analysis. Through ranking, data were analyzed. The item number that has least frequency ranked as the least learned competency. Through the use of SIMs, least learned competencies were improved. After the retrieval of the intervention material, respondents answered the least learned test to assess their mastery level. Percentage or rating scale categorized the class into different classifications. The score per learning competency were analyzed, and computed using the Microsoft Excel Spreadsheet and then presented in table form. Frequency, percentage, and cumulative percentage were computed to analyze the tests result (second quarter and least learned assessment) of the respondents in remediating their least learned competencies in Biology subject.

4. Results

After the conduct of second quarter test in Grade 7 Biology, a table of specification was used to identify the item number in which students had the most and least learned competencies. The researcher did an item analysis, and ten least learned competencies (see Appendix 7) were drawn and identified by using ranking from the frequency of the correct answer. The five identified competencies were the substance of the intervention material. It was validated by the School Evaluation Team including the principal, English teacher and consultant. Each learner was given a SIM. They enjoyed answering the activity card and assessment card in the SIM. They did answering at home and during their vacant hours with their parents, guardians, and peers. To validate the effectiveness and learnings of the respondents from the SIM given, the researcher administered least learned assessment test on the fifth day after the retrieval of the material. The researcher checked the test papers, then computed the percentage by using the standard grading system based from DepEd Order no. 8 s. 2015. The rating scales were used to categorize the mastery level of respondents in each least learned competencies. The researcher also used cumulative percentage to determine the respondents fell within above average level to mastered level, and from average to low mastery level.

The five least learned competencies based from the second quarter test result were revealed in Table 2. As indicated in the table, “identify beneficial and harmful organisms” is the first least learned competency, “describe the different ecological relationship found in an ecosystem” is the least learned competency 2, “differentiate biotic from abiotic components of ecosystem” is the third least learned competency, “differentiate asexual from sexual reproduction in terms of number of individuals involved and similarities of offspring to parents” is the fourth least learned competency, and “differentiate plant and animal cells according to presence and absence of certain organelles” is the fifth least learned competency.

Table 2. Least Learned Competencies based from Second Quarter Test Result

Least Learned Competencies	Learning Competencies
Least Learned Competency 1	Identify beneficial and harmful organisms.
Least Learned Competency 2	Describe the different ecological relationship found in an ecosystem.
Least Learned Competency 3	Differentiate biotic from abiotic components of ecosystem.
Least Learned Competency 4	Differentiate asexual from sexual reproduction in terms of number of individuals involved and similarities of offspring to parents.
Least Learned Competency 5	Differentiate plant and animal cells according to presence and absence of certain organelles.

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At this level, respondents possess the minimum knowledge about identifying beneficial and harmful organisms such as fungi, protists and bacteria, relationship of animal to the surroundings, biotic and abiotic factor of the ecosystem, difference of asexual and sexual reproduction and the components of plant and animal cells.

According to Geleta et al., (2008), in order students will develop their necessary scientific knowledge and understanding, skills and processes, values and attitudes in science curricula, strands in science education will be strengthen and developed to prepare students towards a scientific and technological world.

In addition, the teacher will help learners to deepen their understanding in learning competencies or lessons to be taught. According to Renard et al., (2017), learning competencies should give focus because today, learning happens in a classroom, with lots of other students. The teacher teaches a lesson and goes on the next one. If a student cannot master the lesson or learning material, there are many ways schools try to support those students to catch up.

Isaacson et al., (2016) agrees that providing accessible science learning activities may help to increase both the number of individuals who have learning difficulties and the adoptability and diversity of science learning. Rosenkranzer et al., (2016) added that the understanding of complex, dynamic and animate systems has a special standing in education for the sustainable development and biology. Hudson (2016) concluded in their study that teacher must provide an overview of the strengths and weaknesses of the students, as well as practical suggestions for modifying teaching materials and methods to make learning enjoyable, effective and accessible for all learners.

Moreover, students have learning difficulties of each topic in every quarter. This may be due to the Self-Regulation Theory of Bandura cited by McClendon (2002) that states "self-learning influences the level of goal challenge people set for themselves, the amount of effort they mobilize, and their persistence in the face of difficulties." It means that self-learning influences the performance accomplishments over self-set goals.

Extent Level of Mastery for Learning Competency 1

Table 3 shows the level of mastery of Grade 7 Biology class after the use of Strategic Intervention Material and an assessment on the knowledge retained and remediated competencies.

As reflected in Table 3, five out of 36 students fell within "mastered" rating scale, six students were within "nearly mastered", 16 learners were within "moving towards mastery", eight students among the class were within "average mastery" and one student fell in "low mastery".

Table 3. Respondents' Level of Mastery for Learning Competency 1 after using the SIM

Level of Mastery	Percentage	Frequency	Cumulative Percentage
Mastered	96-100	5	100.0
Nearly Mastered	86-95	6	86.1
Moving Towards Mastery	66-85	16	69.4
Average Mastery	35-65	8	25.0
Low Mastery	16-34	1	2.8
Very Low Mastery	5-15	0	
Absolutely No Mastery	0-4	0	
Total		**36**	

Based on this result, it implies that most of the students performed moving towards mastery level approximately 69.4% cumulative percentage after the use of intervention. There are few students who mastered the competency while there is one or 2.8% of the class who fell in low mastery level or having difficulty in learning the first competency.

These findings were consistent with the study conducted by Westwood (2016), learning difficulties provides guidance on teaching students that encounter difficulties in number of learning areas including science. He used a cross-curricular perspective, he suggested this as the best strategies for reducing learning failure and enhancing student's progress. Fried (2012) added a practice of experiential pedagogy like using of strategic intervention material address student's learning. She believed that experiential pedagogy engages students' knowledge construction and helps students to learn holistically.

As revealed in Table 3, there were few students who fell in average mastery and low mastery.

This may be due to the reasons illustrated by Bahar et al., (2007) such as, students perceived science subject as difficult, there are level of abstractness in science concepts, teacher's assessment in the curriculum or the type of exam administered by the teacher.

Classroom and learning disabilities through instruction of science may contribute to the difficulty in learning. Bulat et al., (2017) concluded that having a learning disability can be one of the most marginalizing factors in child's life and education. Disabilities can be challenging especially in school where there are severely limited resources.

Extent Level of Mastery for Learning Competency 2

Table 4. Respondents' Level of Mastery for Learning Competency 2 after using the SIM

Level of Mastery	Percentage	Frequency	Cumulative Percentage
Mastered	96-100	5	100.0
Nearly Mastered	86-95	6	86.1
Moving Towards Mastery	66-85	16	69.4
Average Mastery	35-65	8	25.0
Low Mastery	16-34	1	2.8
Very Low Mastery	5-15	0	
Absolutely No Mastery	0-4	0	
Total		**36**	

Table 4 shown the mastery level of Grade 7 students in Biology class after the used of the intervention. To assess the mastery level learner's cumulative percentage was used.

As revealed in Table 4, five of the respondents fell within "mastered" level, six respondents performed within "nearly mastered", or 27 respondents fell within "moving towards mastery", eight respondents out of 36 fell in "average mastery" and one respondent was within "low mastery".

This implies that most of the respondents were on "moving towards mastery" level with 69.4% cumulative percentage. There were few students who mastered and nearly mastered the second learning competency. There were nine respondents who fell in average and low mastery level with 25.0% cumulative percentage.

According to the study conducted by Escoreal (2012), the use of SIM reduced the number of least learned skills. He emphasized that SIM avoids student's marginalization and utilized students to cope science lessons. Renard et al., (2017) added the SIM provides students to master the concepts with deeper mastery over the material.

However, Enriquez (2007) suggested that intervention material is the most efficient of combination of interaction between exigencies of the situation and which learners changing demands of the active self.

Emotional factor may also one of the reasons where nine respondents fell in average and low mastery. Meyer et al., (2008), found that the students who adopted a deep approach in learning were very likely to pass the course, while students who adopted a surface approach were very likely to fail. The students who adopted a deep approach also generally expressed greater satisfaction with their instruction.

Extent Level of Mastery for Learning Competency 3

Table 5 reveals the extent level of mastery among Grade 7 Biology class for Learning Competency 3 "Differentiate biotic from biotic components of ecosystem".

As shown in Table 5, four respondents were described as having "mastered" the learning competency 3, one student performed "nearly mastered", five respondents out of 36 fell within "moving towards mastery", 11 respondents were described as having "average mastery", 11 respondents got "low mastery", three learners fell within "very low mastery" and one respondent was described as having "absolutely no mastery".

Table 5. Respondents' Level of Mastery for Learning Competency 3 after using the SIM

Level of Mastery	Percentage	Frequency	Cumulative Percentage
Mastered	96-100	4	100.0
Nearly Mastered	86-95	1	88.9
Moving Towards Mastery	66-85	5	86.1
Average Mastery	35-65	11	72.2
Low Mastery	16-34	11	41.7
Very Low Mastery	5-15	3	11.1
Absolutely No Mastery	0-4	1	2.8
Total		**36**	

Table 5 implies that there are 72.2% respondents categorized "average mastery towards mastered" the learning competency 3, while there are

41.7% cumulative percentage lied within "low mastery to absolutely no mastery".

Findings in this study was consistent and parallel to the study of Isaacson et al., (2016), who examined the potential relationship of accessible hands-on science learning experiences to the development of positive beliefs concerning one's capacity to function in the sciences and motivation. There were respondents on the survey who had low vision that most were failed.

On the other hand, there are suggestions that Fried (2012) had given in order that students may master and transform learning through engagement. One is the student who has minimum knowledge must have affairs and cooperate to honor classmates, to have broader context and understanding driven to more knowledge construction.

Vygotsky (1978) states that the challenge cannot be too great, however. If students are confronted with tasks that call for thinking too far above their current developmental level, they may not be able to understand what is being required of them. Moreover, challenge alone even at an appropriate level may not be sufficient to move students to higher levels of development. Students confronted with challenges to their fundamental beliefs may feel threatened and either persist at their current developmental levels or retreat to even lower levels. To avoid these outcomes, instructors should provide appropriate support to help their students meet the challenges.

Extent Level of Mastery for Learning Competency 4

Table 6 shows the level of mastery of the respondents for learning competency 4 after the SIM was used. Number of respondents was distributed according to the rating scale on how they were performed accordingly. Cumulative percentage was used to analyzed each mastery level.

Foregoing result reveals that there were four respondents who fell within "mastered" level, one out of 36 respondents got "nearly mastered", six were described as "moving towards mastery", eight fell within "average mastery", 15 respondents got "low mastery", two of them were described as having "very low mastery".

Table 6. Respondents' Level of Mastery for Learning Competency 4 after using the SIM

Level of Mastery	Percentage	Frequency	Cumulative Percentage
Mastered	96-100	4	100.0
Nearly Mastered	86-95	1	88.9

Table 6 implies that there are 69.4% categorized as "average towards mastered" on learning the fourth competency, while there are 47.2% based on the cumulative percent fells within "low mastery to very low mastery". According to Mendezabal (2013), students who do not have adequate study habits can affect their achievements. Therefore, 47.2 percent of the class in the research maybe claimed that they are lacking on self-study habits.

Mike (2014) added that if the whole class is struggling with the lesson, it may be due to the syllabus that has been badly designed and the lesson's inappropriate content or failing students come to class late and/or do not show up at all. When they do show up, they send text or play videos during class or otherwise do not pay attention. They do not read the material before class and do not complete their assignments. Some students do not care if they fail.

Based on the different studies, it shows that students are marginally poor in answering the task and coping with the competencies. However, an improvement in their level of mastery was noted after the use of interventions or self-directed materials.

Extent Level of Mastery for Learning Competency 5

Table 7 indicates the respondents' level of mastery after the used of SIM as an intervention to remediate the fifth least learned competency. Rating scale was used to describe the competency based from the least learned test administered to each respondent.

As shown in Table 7, it reveals that six respondents were within "mastered" level, five respondents fell within "moving towards mastery", 12 of them described themselves as having "average mastery", ten performed with "low mastery" level, and three respondents had "absolutely no mastery".

At this level, there were students possesses minimum knowledge in differentiating plant and animal cell according to its absence and presence organelles. Learning tools were not sufficient and students did not pay attention to content.

Table 7. Respondents' Level of Mastery for Learning Competency 5 after using the SIM

Level of Mastery	Percentage	Frequency	Cumulative Percentage
Mastered	96-100	6	100.0
Nearly Mastered	86-95	0	
Moving Towards Mastery	66-85	5	83.3
Average Mastery	35-65	12	69.4
Low Mastery	16-34	10	36.1
Very Low Mastery	5-15	0	
Absolutely No Mastery	0-4	3	8.3
Total		**36**	

Based from the observation, the students only read the content of the test but they did not analyze the questions.

According to Kendra (2014), this happens when a student fails to focus on what is being taught. Maybe they had other things in their mind that day or the material simply was not engaging enough to capture their attention. Another reason for not paying attention is that the student did not see a reason for learning this information; it did not seem to have a purpose related to the subject at hand. There is an encoding failure which may also occur when too much information all at once, causing them to have to pick and choose what the brain will retain.

Parallel study of Ibe cited by Martin (2009) shows that majority of students are poor in sentence analysis. Another reason in which a respondent may fail and not master the competency well is supported by Sigamony (2014) who reveals that if the students do not analyze a lesson he or she fails to grasp a concept to pre-knowledge and their existing knowledge structures which militate against any kind of understanding.

Chaitin (2017) states in his essay "The Limits of Reason", he argued that understanding something means being able to figure out a simple sets of rules that explain the situation.

5. Conclusions

Based on the findings, the following conclusions are drawn:

1. There were five least learned competencies identified after the second quarter test in Grade 7 Biology class.
2. After the use of strategic intervention and assessment, respondents fell within moving towards mastery level and average mastery level in coping with the five least learned competencies in Biology subject.

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