Perspective of Secondary Teachers in the Utilization of Science Strategic Intervention Material (SIM) in Increasing Learning Proficiency of Students in Science Education

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Abstract

The phenomenological research investigated the perspectives and experiences of five science teachers on using strategic intervention material (SIM) in their respective science classes. The use of these materials is important towards achieving the needed competencies of the students which they failed to achieve in regular classroom instruction. A total of five science teachers were recruited from different schools in Baguio provided that they were able to craft or at least to utilize science SIM. The research indicated that the teachers held variety of views of SIM integration. These views influenced their use of SIM in the classroom, especially during remediation sessions as an abridgement and re-teaching tool. They view that SIM will promote autonomous learning and memory enhancement among learners to better their performance in understanding many complicated concepts and skills in science. However, despite these advantages, teachers encounter barriers during preparation and implementation proper of the SIM.

Keywords:

SIM Utilization, Science Teachers, Science Education, Learning Proficiency

Author's Notes

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Introduction

In this technological age, science subdues and even drives societies with its ideas and products and it is very likely that the impact of science and technology on people's lives will persist to exist and increase in the coming years. Through science, the way people think shifts to a more critical approach. Frequently, science has been recognized to be of great significance because of its connection to technology, which, in a government perspective, is a priority area for economic development (Elkington, 2015). The reason probably why many countries have embedded the very sense of science in their respective educational system so as to enable citizens to actively participate in modern societies. In fact, according to Ogena, Lana and Sasota (2010), the major factor in a nation's development is the emphasis on science and mathematics education which brings the nation to integrate science and technology in their national agenda.

However, learners perceive science as a difficult subject regardless of its importance. It is a common observation that learning science creates more negative feedback to many learners than seeing its economic value. Four major science subjects, Biology, Chemistry, Physics, Earth and Space, have been viewed as the hated subjects in the curriculum, which would likely fail completing the necessary requirements and get low performances in both academic and conceptual reasoning skills. To a multitude of students, science education was never an enjoyable avenue for them to learn important concepts that are relevant to societal situations; thus, academic achievement in this field is relatively low.

The two international sources of information and analysis on science education, i.e. Programme for International Student Assessment (PISA) and Trends in Mathematics and Science Study (TIMSS), aim to assess the extent of student's achievement in science and other fields. TIMSS, specifically, is an international study on student's ability to solve scientific as well as mathematical problems participated by many countries around the world. In this assessment, the Philippines was among the bottom five of poor performers in Math and Science. Dela Cruz (2012) reported that the Philippines placed 36th in science out of the 38 countries who participated in the said assessment. Similarly, results in the 2003 TIMSS showed that the country ranked 23rd of the 25 countries in grade four science and 42nd out of the 45 participating countries in second year science.

Dios (2013), reported a similar trend in the student's achievement in the annually conducted National Achievement Test (NAT) for the fourth years. The assessment showed similar unsatisfactory achievement in the overall performance of the students across the country. In the 2005 NAT, performance of the students in science got the lowest mean percentage score (MPS) with 39.49 among the five (5) subjects assessed. Performances in the 2006 and 2012 TIMSS yielded the same dismaying performance with MPS of 37.98 and 40.53, respectively.

Deficiency of educational facilities (Salem al-amarat, 2011) and instructional materials (Ogbu, 2015), large class size (Eison, 2010), poor instruction (Eison, 2010), and non-differentiated instructional methodologies and curriculum (Weselby, 2014) are problems that threaten education process. The current educational system of the Philippines is filled with problems on classrooms shortage and scarce funding to provide for instructional materials required in each science classroom. These problems impede teaching and learning to succeed. Due to these predicaments, successful teaching process is encumbered and, in turn, achievement in learning is not met. Many students are not able to cope with these problems hence can result to their poor performance. The ultimate goal of teaching is to provide appropriate and effective instruction to students and, in turn, promoting effective learning. Thus, teachers, themselves, become the agents in combating these predicaments to achieve successful education process by devising and providing necessary materials that are suitable to students need.

Teacher's initiative in crafting and utilizing instructional materials (Dy, 2011) bridges these gaps towards the achievement of the educational goals: learning the concepts and mastering the skills. Productivity of teaching Science will be enhanced when there are available, sufficient and strategically-designed (Salviejo et al, 2014) instructional and intervention materials appropriate for the multitude of students, considering their learning styles, personality types and stress-coping mechanisms (Dacumos, 2015). Hence, it is imperative that science teachers have a holistic understanding of their learners to craft personalized instructional materials, thus addressing students' individual needs to achieve better comprehension in science.

The role of developing instructional and intervention materials in the teaching-learning process should not be undermined. It plays an integral role (Salviejo, Aranes & Espinosa, 2014) toward the achievement of a successful interplay of teaching and learning. As claimed by Olawale (2013), "the importance of Instructional Materials in any teaching-learning process cannot be over emphasized." If properly prepared, these materials will be effective in terms of enhancing, facilitating and making teaching-learning easy, lively, and concrete.

Strategic Intervention Material (SIM)

The Department of Education (DepEd) had employed 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 matter like atoms, molecules, and ions which students believe as a vague symbolism of what they know about matter and other related concepts in science. SIM is an instructional material that is prescribed by the Department of Education (DepEd) to increase the level of proficiency of students in science subjects.

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.

Integration of Strategic Intervention Material (SIM) in Science Lessons

Strategic Intervention Materials (SIMs) are aimed to help teachers provide students the needed reinforcement to make progress in their respective subjects. Various studies have particularly pointed out the effectiveness in the utilization of SIMs in their respective science lessons.

Gultiano (2012) studied the effect of strategic intervention material on the students' academic achievement in Chemistry. The study employed the experimental design and found out that the experimental group, where SIM was integrated, performed significantly better in the post test. Gultiano (2012) concluded that the use of strategic intervention materials are effective in mastering the competency based-skill in chemistry based on the mean gain scores in the posttests of the experimental and control group. Similarly, Salviejo, Aranes, and Espinosa (2014) explored student's learning approach and investigated the effect of strategic intervention material-based instruction (SIM-BI) on their performance in Chemistry. Using the pretest-posttest pre-experimental design, result showed that the use of SIM-BI has significantly enhanced the performance of the students in Chemistry and that surface and deep learners equally performed in Chemistry when SIM-BI was integrated in their Chemistry Classes.

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, and non-mendelian genetics. His use 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. She particularly emphasized that SIM must be implemented to avoid pupils' marginalization. Proving that students can cope with science lessons with the teacher utilization and integration of intervention materials.

Based on the abovementioned information, the utilization of an intervention material can significantly increase the performance of the students in the least mastered skills in science. These studies revealed that the use of SIMs plays a pivotal role in elevating the memory level of the students, in grasping the different concepts in science, and with the integration of various strategies in the implementation of the material, the teaching-learning process becomes interesting.

Purpose of the Study

This paper sought to study the perspective of secondary teachers in the utilization of science Strategic Intervention Material (SIM) in increasing the learning proficiency of students in science education. Specifically, this study sought to answer the following problems: 1) How do science teachers currently use SIM in their science classes? 2) How does SIM integration impact instructional practices in science classes to increase the level of proficiency of learners? 3) What are reasons why science teachers do not use SIM regularly as an integral part of instruction?

Methodology

Research Design

This study used a descriptive phenomenology as its research design. Faulkner and Faulkner (2009) defined phenomenology as "a research design which is most appropriate when the purpose of study is to explore and create a detailed description of phenomenon" and used further to deduce information from one's lived experiences and, in turn, forming a description of universal importance. This study is founded on the belief that integrating the use of strategic intervention material (SIM) in Science by secondary teachers may have an important impact in increasing the learning proficiency of students in science education.

Participants

Teachers from the Division of Baguio City, Philippines were interviewed to gain information of their utilization of the science SIM. The actual sample size in this study was five science teachers, comprised of two female and three male teacher, who were chosen through purposive sampling. For one to be an eligible participant of the study, one should be a junior high school teacher who had an experience of crafting and/or utilizing a strategic intervention material (SIM) in any of his classes in science. The reason for setting these criteria is for the participants to provide sensible and relevant perceptions of their first-hand experiences in the crafting and/or utilizing of the intervention material.

Data Collection Procedure

To capture the essence of the phenomenon under investigation, a two-layered approach to data gathering was employed. An invitation letter was sent to the science teachers prior to the data gathering. This letter detailed the nature of the investigation and the scope of their involvement. It also informed the participant regarding the nature of the probing and how much their involvement will be in the current study. With this consent, the interview was scheduled based on participants' availability and convenience. Prior to their involvement and engagement in the study, participants were informed of their right to withdraw (Oates, Kwiatkowski & Coulthard, 2009).

In the preliminary stage, the participants' personal data sheets, *robotfoto,* were personally handed to the five participants, which included their vital information regarding their educational attainment, current position, number of years in service. The information that were generated from this data gathering episode facilitated the development of the *aide memoir* which contains key interview questions. A person's anonymity was highly protected as personal information were not disclosed. Data from the respondents are kept from other researchers to guarantee confidentiality and anonymity. In this study, instead of names, codes were used, although some teachers opted to be identified through their names.

The second segment of the research was comprised of the actual in-depth interview with the participants of the study. The interview questions were based on the availability of the respondents and in the area which they personally identified. Face-to-face interview was observed to ensure the creation of a more natural and open atmosphere, establishing, therefore, camaraderie between the participating science teachers and the researcher. Questions were open-ended to enable the respondents to answer in as much detail as they like in their own words. The *aide memoire* investigated the teachers' experiences in the utilization of SIM in their classroom instruction. Specifically, the following key questions were asked during the interview: a) "How do science teachers currently use SIM in their science classes?" b) "How does SIM integration impact instructional practices offered in science classes to increase the level of proficiency of learners?" c) "What are reasons why science teachers do not use SIM regularly as an integral part of instruction?" Though these key questions were identified, follow up questions were raised to further probe the responses of the teachers during the interview. Interviews were tape-recorded to capture all things that transpired in the process.

Data Analysis

The tape-recorded interviews were individually transcribed to arrive at an extended text. Transcription of the tape recordings were done as soon as the interview concluded (Hatch, 2002). A phenomenological reduction was used for the extended texts through a repertory grid. This is to enable the researcher to observe both the cool and warm analyses of the information collected from the participants. The cool analysis part consisted of the participants' significant points or statements. These statements were the basis in the conduct of the warm analysis stage wherein the categorization of the data were formulated and that the themes were evolved. The themes and subthemes that emerged in the study were further subjected to member checking procedure via correspondence. Correspondence allows the participants to be approached to ensure accuracy and consistency of transcription and interpretation (Lincoln & Guba, 1985). Through correspondence, the researcher was assured of the trustworthiness and truthfulness of the data collected.

Results and Discussion

The data for this study were collected from a purposive sampling of science teachers across the city of Baguio, Philippines with varied years of teaching experiences. Two of five teachers are PhD unit takers, one master's degree unit taker and two are bachelor's degree earners.

Themes (see Table 1) were derived from the different perspective of teachers in their utilization of SIM in science. To facilitate the discussion of the results of this study, the findings are displayed based on three research questions: a) How do science teachers currently use Strategic Intervention Material (SIM) in their science classes? b) How does SIM integration impact instructional practices offered in science classes to increase the level of proficiency of your learners? c) What are the reasons that science teachers do not use SIM regularly as an integral part of instruction?

SIM Utilization in Science Classes

The science teachers who participated in this study reported different views on using SIM in their respective science classrooms. Two major themes of SIM utilization emerged from the categorized statements of the respondents: as a re-teaching tool and as an abridgement tool.

Re-teaching Tool

Participants considered SIM as a re-teaching tool when primarily, their purpose is for the mastery of the least grasped topics and lessons. Four of the five participants made references to this re-teaching tool factor. Teachers who have already integrated the use of SIM in their respective science classes view the material as an integral part of their remediation planning and teaching, as a whole. They considered it as a tool to allow students to become proficient learners as it gears towards enhancing their grasping capability or mastery skills of a specific science topic by integrating it to their regular classroom instruction to help students improve their critical thinking skills and enhance their science ability. As one participant claimed, *"As a science teacher, I use strategic intervention materials to re-teach the lessons which are not so much clear to my students and to help them gain mastery of the topic."*

Furthermore, almost all the participants with this re-teaching tool perspective identified the benefits of using SIM for remediation purposes. One participant claimed the importance of re-teaching lesson using the SIM as a remediation material for students whose performance is not at the level of competency expected of them:

Table 1. Perspective of Secondary Teachers in the Utilization of Science SIM Themes

Question	*Categorized Significant Statements*	*Emerging Themes*
How are you, as a science teacher, currently using SIM in your classes?	• *As a re-teaching tool for mastery of skills of students* • *Re-teaching the topic to a special group of learners to mediate and intervene with their insufficient mastery level is usually stipulated.* • *A Strategic Intervention Material (SIM)is to be used to reteach the least mastered topic.* • *As a remediation tool for slow learners by having a one on one remedial classes or as take home assignment* • *In my remedial classes, teacher acts as a facilitator, no lecture, the students read the SIM*	***Re-teaching Tool***
	• *As a simplification material for challenging lessons*	***Abridgement Tool***
How does SIM integration impact instructional practices offered in your science classes to increase the level of proficiency of your learners?	• *By engaging students to learn by themselves in the learning process to improve their academic performance* • *By shifting the role of the teacher from being a lecturer to becoming a facilitator of learning* • *By allowing self-learning amongst students to answer questions at their own pace*	***Promotes Autonomous Learning***
	• *By serving as a memory tool for learners to recall significant concepts of the lesson* • *By improving the learner's acquisition of the knowledge or skill of the topic*	***Promotes Memory Enhancement***
What are the reasons that you, as a science teacher, do not use SIM regularly as an integral part of instruction?	• *It is time-consuming during preparation, implementation and checking of the material* • *The creation of SIM takes careful thought therefore time would be a factor* • *It would be difficult to prepare one because of the time it would take to make one*	***Preparations*** ****Time Constraints***
	• *No available sources/funds for the crafting and reproduction of the material* • *No support from the administration for funds*	**** Support from Administration***
	• *Planning of creative and investigative activities for the material is difficult* • *The creation of SIM takes careful thought therefore time would be a factor* • *Lack of knowledge in constructing one*	**** Teacher Competence***
	• *Monotonous assessment found in SIMS* • *Not suitable for skill-based learning of specialized topics such as manipulation of microscope*	***Implementation*** **** Flexibility of SIM***
	• *Non-cooperative response of the students in accomplishing the SIM* • *Inability to administer such because of lack of time due to non-participation of students* • *Individual differences. Fast learner students find it as boring or not challenging.* • *Time consuming, if given to big group of students, they talk with their classmates instead of reading and answering the SIM*	**** Student Responses***

> If in a quiz and a certain percentage of students was not able to suffice/reach the passing score, a re-quiz takes place to suffice the learners' failing scores. Re-teaching the topic to a special group of learners to mediate and intervene with their insufficient mastery level is usually stipulated. As for preparation, a Strategic Intervention Material (SIM) is to be used to reteach the least mastered topic or skill.

Besides integration of SIM in their regular teacher to diversify their instruction, participants also made references to their desire to use SIM for special remediation classes, especially to those lagging behind the level of competency they are required to deliver. According to Salviejo, Aranes and Espinosa (2014), the use of intervention materials is highly regarded as tools for remediating poor achievements of the learner. Furthermore, he said that SIMs are strategically prepared and designed for teaching remediation for low achievers in the subject. It is given after the regular classroom instruction to students who were not able to grasp the concepts of the subject matter.

One teacher particular cited remedial classes as an avenue to which utilization of SIM should be highly applied and that teacher role is minimized, being the facilitator of learning. She said, *"[I use SIM] in my remedial classes, [where] teacher acts as a facilitator, no lecture, [and] students [accomplish] the SIM."* Another participant supported this with, *"It is not used always, as they are for learners with developing knowledge on the concepts in science. Teachers are facilitators in this way."*

Truly, learners play an active role in learning. Discovery and inquiry are focal strategies in a student-centered learning environment tracing its constructivist principles from Vygotsky's Social Development Theory. Teachers' role had shifted to facilitating meaning-making of students rather than spoon-feeding them with concepts that they are already familiar with. The use of SIM serves this purpose. SIM promotes constructivism, letting the learner construct his own learning from the given material – strategically prepared and implemented.

Abridgement Tool

The lone participant that identified the use of SIM as an abridgement tool view that the material should emphasize the simplification and summarization of the concepts learned in a regular classroom teaching. He claimed,

> *"SIMs, in my class, should simplify the lessons learned in the classroom, especially that science is regarded to have many difficult concepts that one cannot easily grasp."*

This statement indicates that many scientific concepts are complicated and that these concepts need to be simplified before non-specialists in the hope that they are at the level of their understanding. Science is seen as a body of knowledge about how things work. Commonly, in regular instructions, teachers get the knowledge from the textbooks and transfer it to the students. That is how it often appears; to parent, to students, and sadly to many science teachers—a dilemma in science teaching.

Through summarization, the main concepts are highlighted in SIMs over trivial details of the lesson. This technique integrated in science SIM is more effective to many (Dunlosky, Rawson, Marsh, Nathan, and Willingham, 2013) than the typical strategies that students favor, such as re-reading and highlighting. Some learners have hard times in grasping details of the lesson in regular classroom instruction, therefore, SIM can function as an abridgement tool aiding learners to focus on the main concepts necessary to achieve science competencies.

The lone respondent who made this view brought out the major problem that many students and teachers, alike, long have been encountering in science education. While the use of SIM promotes constructivism, as discussed above, a problem though, is that in trying to encourage students to construct their own understanding, the uncertainty of their learning still remains. According to Wallace and Louden (2005), just because the students have the right words written down in their books, there is no guarantee that the meaning of those words will be translated into understanding the concept.

Teachers, being the facilitator of learning in this material, should strategically create a strategic intervention material (SIM) in science that will simplify the complicated concepts in science and highlight the major ones important in the achievement of the necessary competencies in science. Simplifying and summarizing these concepts does not make science simple, and learning for understanding involves much more than knowing by recall. The science teacher should incorporate appropriate pedagogy in the material to create opportunities for students to be challenged by the constructions they, and their colleagues, are forming.

The Impact of SIM Utilization on Educational Practice

Participants in this study varied in age, gender, teaching experience, and educational attainment. With these varied features, their responses yielded two major themes to answer the question on the impact of SIM utilization on educational practice: promotes autonomous learning and memory enhancement. In the former discussion, how SIMs are utilized in science classes is addressed. In the succeeding discussion, teachers' perspective on the impact of SIM utilization will be explored.

Promotes Autonomous Learning

The data provided results that revealed participants view of SIM integration in science classes as a way to promote autonomous learning. Three of the five participants believed that SIM will advance the learners into becoming independent and autonomous learners. Furthermore, they believe that SIMs, when prepared properly, teachers and learners will be benefited. Teachers will go away from stringently delivering long waves of discussion into becoming facilitators of learning. Learners become constructors of their knowledge, thus promoting critical thinking among them. As claimed by one teacher,

> *"Usually if the SIM fits the learning style of the learner or if it were advantageous on his/her part, improvement on the acquisition of the topic or skill taught is very much evident as shown in his/her assessment results. If in case SIMs are prepared well and are well-thought of, it would be very much of an advantage to both the teacher as well as the learners themselves. It would benefit the teacher so that less supervision is taken. Although SIMs are very much like that of modules, they differ in many ways. The learners on the other hand would be developed in discovery and inquiry learning. Moreover, they would develop independence in learning and metacognition being aware on their own learning."*

Truly, the use of SIM has been regarded to develop learners' dependency of their capability and less from the teacher – autonomous learning. Macdougall (2008) defined autonomous learning as "characterized by personalization, self-directedness and less dependency on the educator for affirmation, and which therefore enhances rather than hinders the capacity for constructive collaborative participation in the workplace." Autonomy in learning, however, has been mistakenly understood as independent instruction. It may be a fact that students who are capable of independent instruction may be effective in autonomous learning since they are able to acquire the necessary skills to perform such autonomy. Teacher's role in this process should not be discredited.

Ehrman (1998, cited by Yan, 2012) compared a classroom setting to a theater stage where students are actors. The teacher, on the other hand, assumes a lot of roles such as director, scriptwriter, audience, coach, prompter, but above all, another actor, while still giving emphasis on varied aforementioned roles. The teacher, in a communicative autonomous class, should shift the role from being teacher-centered toward making the learner the central character of the program.

Some teachers misunderstood learning autonomy as leading to redundancy of the roles of teacher due to the fact that learners are now capable of performing the same roles as their teachers. In fact, according to Yan (2012) in his study regarding the roles of teachers in autonomous learning, "although learner autonomy would help shift the learning/teaching responsibilities from the teachers to the learners, teachers' responsibility should be reinforced rather than reduced". Yan (2012) identified two major roles in learner's autonomy, i.e. as managers and organizers.

Another teacher supports the earlier comment, however putting also emphasis on the physical construction of SIM and peer teaching. He claimed that,

> *"Student, himself, remembers the lesson well when SIMs are strategically-devised to aid in their learning experience. Most of the time [his] favorite character or a theme is used to act as the teacher so that this will be a student-centered activity, and at the same time, less talk for the teacher. It would also develop the comprehension skills of the students and will develop peer teaching skills as they would help one another in aspects they find difficulty in understanding."*

Appealing and creative SIMs usually require time and effort to make. Truly, it is an inspiration for many that teachers spend the midnight oil just to make the material. SIM making is a tedious task, but making it will make learners learn best. When students are familiar and most of all interested in the crafted SIMs, learning becomes not only effective but fun and interesting for them.

The use of SIM would intensify constructivism amongst learners, especially those who are low performing in a science classroom, and, in turn, promoting autonomous learning.

Promotes Memory Enhancement

While the first theme emphasized the use of SIM to promote autonomous learning, in which construction of knowledge is dependent to the student's capability. The succeeding discussion will revolve around memory enhancement as an impact of the utilization of SIM as perceived by teachers.

Two of the five participants regard the use of such material for this reason. They see that SIM utilization will enhance the ability of the learners to memorize concepts. As verbalized by one participant, "SIM integration in science classroom impact educational practice by serving as a memory tool for learners to recall significant concepts of the lesson." Furthermore, it was supported by another teacher respondent with, "It [Science SIM] impacts educational practice by improving the learner's acquisition of the knowledge or skill of the topic." They believed that part of understanding the concept is also through memorization.

Science has a reputation for being difficult, let alone the many concepts that had to be memorized, i.e. formulae, scientific names, and so on. The students' transition from high school expects tests for which they can prepare by memorizing material (Ganem, 2012). And this is an inevitable truth. Students cannot help but learn stuff by memorizing especially those whose future career may not necessarily utilize the difficult concepts of genetics, biochemistry, physics and so on, understanding and realizing its importance to their respective life may not be observed. Hence, resorting to memorizing. More than understanding, students cannot help but memorize them as well.

However, memory learning catches a lot of benefits. Many educators prefer teaching creativity and problem-solving, while disregarding rote memorization as for them, it is essential and even adverse. It is, however, important to point out that memorization can still play significant role in learning while considering the importance of promoting creative and analytical activities. Some benefits include training the brain to remember, improving neural plasticity and so on. Klemm (2005) claimed that memorization trains the brain to develop learning and memory schemas that facilitate future learning. Thus, when one teacher strategically and creatively plan for SIM, one thing that it should bring about is to allow learners to memory learn the concepts. The use of mnemonic devices and other memory techniques (Kelly, 1994) are just few of the many strategies that teachers can integrate in the crafting of science intervention materials.

Barriers to SIM Use in Science Classes

The interview questions generated data findings that provided information on barriers that hamper SIM integration as identified by participants. With the varied answers of the participants, two themes emerged: preparation and implementation. Under each theme, the respondents' varied answers were classified into subthemes: preparation includes time constraints, support from administration and teacher competence, while implementation includes flexibility and student responses.

Preparations

The five respondents share the same sentiments regarding the problem on preparation of SIM as a tool to the students' learning. Formulating a well-defined material for student intervention is a critical initial step as it provides the foundations of the very material for the purpose of students' remediation. The varied responses of the teachers brought out three subthemes: time constraints, support from administration, and teacher competence.

Time Constraints

The data based on the question regarding the barriers encountered by the teachers revealed that time is a factor in crafting SIMs. Participant one stated, "the creation of SIM takes careful thought therefore time would be a [big] factor." In other words, planning an effective and well-thought out instructional tool particularly for non-performing learners can be very tedious. A teacher, foremost, is faced with time constraints toward achieving the goals of the curriculum and students' needs, especially during the preparation period.

A related study (Belzile, 2015) reported that it took teachers two years to develop a set of interactive tutorial materials for students and faculty, alike. The development posed a challenge on time due to problems encountered on collaboration and testing of the material (Belzile, 2015) for the students and teachers. The time needed to craft SIM that is effective towards students' skill and knowledge enhancement becomes a constraint for many teachers hence demotivating teachers to develop one for their students.

Statements provided by the other interviewees include, "It would be difficult to prepare one because of the time it would take to make one" and "It is time-consuming during preparation, implementation and checking of the material." These statements unanimously prove that making SIM requires dedication of time to properly conceptualize effective materials, activities and assessment to serve its purpose of improving the learning proficiency of the students with lower academic performance in science education. On top of this, the process of undergoing the material to validity and reliability testing (Kimberlin & Winterstein, 2008) to assure that materials to be produced will serve its purpose. This challenges therefore science teachers to take time to emphasize more on the materials' quality more than the quantity (UNESCO, 2005) to achieve the goal of crafting the intervention material, that is to enhance students' low performance in science education.

Support from Administration

The role of administration, i.e. principal, school heads, and so on, is a big factor in the instructional process through provision of funds and resources for the preparation of an effective and strategically-designed SIM to level up the declining proficiency of science learners. One participant said that one constraint in the utilization of SIM is the availability of fund sources stating, "No available sources/funds for the crafting and reproduction of the material."

It is too much for teachers to plan and prepare for an effective material for remediation. The administrations' assistance in providing instructional resources to teachers is a manifestation of the level of school's achievement as Heck, Larsen and Marcoulides (1990) reported. Furthermore, Venezky and Winfield (1979) characterized that responding to the needed materials would mean "utilization of instructional resources to achieve maximal student outcomes." Allocating resources and materials should be of great effort from the administration to provide basic instructional needs to the teachers. This is one thing that is possibly missing in the current educational system, especially in the public sector.

Many educators complain about the limited support of the administration in terms of local funding for the purposes of instructional material utilization. Hence, many opt not to prepare such material as this may be costly especially in its reproduction.

Teacher Competence

Eraut (as cited by Orji and Abolarin, 2012) defined competence as the ability to perform the task and roles required by the expected standards. Competence of teachers in crafting materials is essentially a must towards effective learning of students. Of all remediation media, printed material such as SIM is significant. Primarily, these materials boost learning depending on the assimilated teaching skills while students progressively deduce mastery of the subject. The respondents unanimously said that the first step to SIM is to strategically plan the material, which incorporates creativity. As verbalized by one, "Planning of creative and investigative activities for the material is difficult."

Effective teachers are able to envision instructional goals for their students, especially those who need special attention in their learning, then draw upon their knowledge and training to help students achieve success. However, many teachers have poor knowledge on the preparation of the material or at least crafting SIM that is effective for their learners. Many teachers have a lagging knowledge since seminars and workshops are not provided on a regular basis.

All the participants agreed that in order to create the material, one must make sure that SIM has been carefully thought of. "The creation of SIM takes time," as claimed by one of the science teachers. As part of promoting the wide use of the material, the Department of Education included SIM making that is open to all science teachers among the annual competition categories in science fair in the school, division, region, and even national level. However, it is due to this competition that teachers craft SIMs that may not have been strategically-designed. One respondent mentioned, "lack of knowledge in constructing one" is the basic dilemma of many science teachers.

Learners with insufficient level of understanding of the concept will overcome such problem through SIM that is a well-structured and a carefully-planned material. The appropriate utilization and planning of SIM by teachers enable the students to develop understanding of the science concepts, develop functional knowledge and manipulative skill.

Teachers' expertise and professional experience in the preparation of SIM is crucial in delivering successful learning experience using the material. As claimed by Selahattin and Ilknur, 2010) teacher's competence in preparing materials is a major requirement to meet educational goals. There is a need for teachers to receive profound training focusing on effective planning, preparation and implementation of SIMs for students undergoing remedial sessions. These needs advance educators to effectively implement their lesson through instructional and intervention materials to every student especially to those who are lagging behind in normal classroom instruction.

A. Implementation

The second theme that emerged from the responses of the participants revolved around the problems on the implementation of SIM, while the first theme dealt on factors relating to the preparation of the material. Even in the implementation phase, barriers on the integration of SIM surfaced. From their various responses, two subthemes were categorized: flexibility and student responses.

Flexibility of the SIM

One characteristic of a well-crafted SIM or any instructional material is its flexibility. This entails that materials uphold the competencies that the curriculum decree as necessary for the students to develop. Furthermore, these materials are flexible enough to be revised or adapted as needed, giving them greater flexibility than a commercially produce textbooks and other instructional materials.

However, as cited by the teachers, one limitation of SIM utilization is its non-encompassing nature. As verbalized by the respondents, "[SIM is] not suitable for skill-based learning of specialized topics such as manipulation of microscope". Many materials only involve theoretical knowledge, which means that the use of SIM is confined, mainly, on concept acquisition, rather than skill development or practical knowledge. Bradley (2012) posits that "practical knowledge can often lead to a deeper understanding of a concept through the act of doing and personal experience."

Furthermore, one participant mentioned about the "monotonous assessment found in SIM." While SIM integrates creative activities for the students, traditional assessment, however, becomes a problem rather than incorporating authentic assessments to coincide with the creative aspect of the activities incorporated in the material. Shifting to an assessment that is unique and can be relavant to the students is encouraged rather than sticking to the stiff traditional approach. Mueller (2014) distinguished traditional assessment from authentic assessment. He said, on traditional assessments, students are typically given several choices in selecting a response, it is contrived, recalling, and recognition of knowledge unlike authentic assessment in which constructivism approach is highly observed.

It is very well encouraged that SIMs have to be aligned to a constructivist approach in which learners perform task rather than merely selecting responses, real-life rather than contrived, and construction and application rather than recalling or recognition of knowledge.

Student Responses

The last subtheme under implementation is on student responses on the use of science SIMs. Teachers' responses on this subtheme revolved around students taking SIMs for granted. As one teacher verbalized, "[There is] non-cooperative response of the students in accomplishing the SIM". Possibly, this is due to the fact that SIMs are produced without the sense of creative approaches and authentic assessments. The same sentiment is shared by another teacher saying, "inability to administer such [SIM] because of lack of time due to non-participation of students".

These comments reflect that SIMs are not serving its purpose which is to improve students' performance in science subjects. Instructional materials as a whole takes the students to formulate or generate ideas in order that learning would be faster and easier. But in order to serve that purpose, it should arouse the interest of the students. This is possibly the reason why learners are not participative in the accomplishment of such material. It is not motivating enough to arouse the students' interest.

Romano (2015) concluded that students want to have things which make them curious about it. Manipulation is one thing that learners would love to do in order to learn the difficult concepts in science education. Hence, teachers are expected to become as creative as possible to yield an effective SIM to level up the proficiency level of students in science education.

Conclusion

This phenomenological study attempted to capture the perspective of science teachers in the utilization of strategic intervention material (SIM) in increasing the level of proficiency of learners in science education. This study successfully surfaced the unique perspectives of teachers in terms of the SIM utilization and integration, impact to educational practice and barriers in the use of the material. Their overall perspectives were summarized through the continuum which presents the general themes that emerged from the varied responses of the science teachers.

For all the participants in this study, SIM integration has become an important part of their teaching, especially in increasing the proficiency level of students whose performance in science education is at the lower levels. The findings demonstrate that with appropriate curriculum-based, strategically-planned and creatively crafted SIM integration in classroom practice, teaching science and facilitation will effectively become the tool for learners' understanding and appreciation of many concepts in science. The participants in this study reported a variety of views of SIM integration in the classroom especially after regular classroom instruction. Some used SIM as a re-teaching tool, some embraced it for the abridgement of complicated science concepts. The data indicate that these teachers view SIM dynamically as it does not only confine them in one perspective and that they willingly use the material to motivate "behind" learners to become constructors of their knowledge. The use of SIM, henceforth, was viewed by many teachers to have two major impacts, i.e. promotion of autonomous learning and memory enhancement. Truly, constructivism is an advancing belief for learner's stimulation of their critical thinking. Through this, students are able to be more than a passive type of learners and become active agents in the understanding of science concepts. While barriers during preparation and implementation surfaced as themes as to reason why the regular use of the SIM is not observed, teachers thought of ways to overcome it. They view the importance of the use of instructional material such as SIM as an integral part of learners' improvement in understanding of the sciences.

This study, however, has limitations. The findings are not reflective of the experiences and perspective of all science teachers given the same situation. Nonetheless, this study brought about trends worthy of further investigation. To this end, the researcher is hopeful that administrations, science teachers and students will see the value of SIM utilization as this enhances learning capabilities of students and may reverberate in the improvement of students' performance in national and international assessments.

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