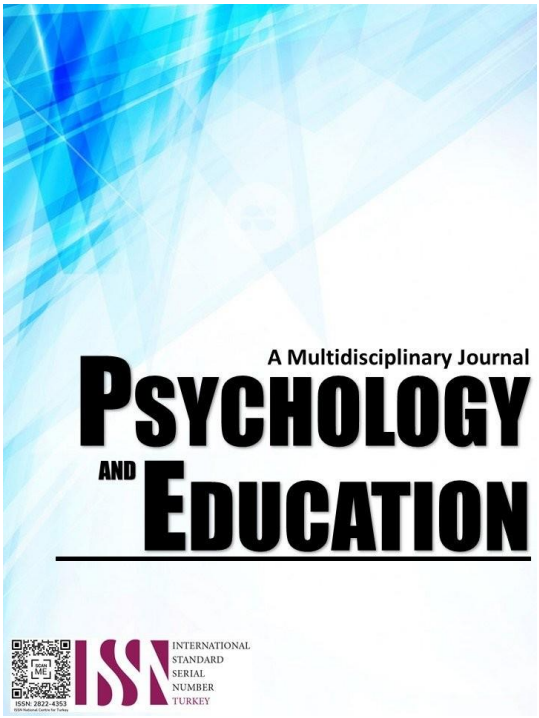
THE STATUS OF K-12 SCIENCE AND MATHEMATICS SPIRAL CURRICULUM: A CASE STUDY



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Research Article

The Status of K-12 Science and Mathematics Spiral Curriculum: A Case Study

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Abstract

One of the importance of curriculum is to describe how students should learn in a systematic and intentional way that encapsulates the fundamental skills and learning areas. Spiral curriculum describes how knowledge being transcribed and organized in various ways of thinking in order to the student gains deeper knowledge on the topics. Bruner's, (1966). This study aimed to examine the status of K-12 Science and Mathematics spiral curriculum implementation at Datu Saudi Uy Ampatuan Memorial National High School, Maguindanao Del Sur Division. Thus, it utilized qualitative case study approach patterned on Clarke & Braun, (2017). Thematic Analysis. (TA) that provides a meticulous analysis of data with small group of people who were purposely chosen in order to explicate and delineate the experiences in the phenomena. Thus, the study revealed that, the preparations of the school administrators and teachers in the implementation of the spiral curriculum were Designing Course Outline, Utilizing all Available Resources. Hence, the challenges and problems encountered by the school administrators and teachers in the implementation of Spiral Curriculum in Science and Mathematics were Less Support from the Administration, Insufficient Educational Resources, Lack of Technological Capacity Building, Mastery of Subject Matter, Low Level of Students Performance, and Congested Topics. Moreover, the coping mechanism of the teachers were, Use of Personal Fund and Resources, Resourcefulness, Pursuing Post Degree Program, Contextualization, Differentiated Instruction, Most Essential Learning Competencies. The study demonstrates the importance of spiral curriculum on the students' active engaging learning. Furthermore, teachers faced challenges on the lack of resources and educational materials in the implementation of the curriculum. Paper suggested that, the department of education may conduct various training programs for the school administrators and teachers in response to the effectiveness of the curriculum.

Keywords: *basic education, k to 12 program, science, mathematics, spiral curriculum*

Introduction

Planning curriculum seems that there are many questions arrived where curriculum implementer that needs to consider. (Harden, 1986). To implement the education framework for the twenty first century, alignment of academic endeavors, such as, evaluation, instruction, and assessment. Aquino, (2024). As counterpart, the main objectives of the program is to evaluate the effectiveness. Like, the content of the curriculum, teaching methods, assessment, and educational strategies. The essence of curriculum is to make a roadmap that guides teachers on what to teach and how to teach. In order to ensure students competitiveness academically. A spiral curriculum is standards order of planned. As described by (Harden & Stamper, 1999). As cited by, Chaudry, (2015). It is important to note that all types of curriculum implementation cannot take place without the learners. And the center of the educative process. Learners can acquire knowledge or experiences that apply into real life situation.(Joseph, 2021).

The spiral curriculum according to Bruner's theory, (1960) refers to the approach of presenting knowledge through different methods of organization and thinking, which allows students to achieve more profound understanding of the subjects. The features of spiral curriculum were topics are revisited, high level of difficulty of the topics, new insight is related to previous learning and the competence of students increase. As scholars described Bruner's approach.

In the International assessment has indicated the case and reported the issues that United States students lose ground in Mathematics in the spiral curriculum. (Snider, 2002). Mathematics curricula are poorly designed and considered factors in creating educational inequalities, spiral design where numerous topics are ambiguous. Diverse learners have faced serious challenges. Schmidt., et al (2002). The prerequisite knowledge does not give emphasis. Moreover, spiral curriculum disadvantage does not sufficient and ample time to review once the units are done. Fewer lesson to review of introducing the topics within the chapter. Then, once the learners proceed to the next chapter, previous topics are not be seen anymore. (Dempster, 1991). Traditional Mathematics text books which backbone of the instruction hinders acquisition of foundation skills tends to low Mathematics performance. Textbooks may be poorly designed in numbers of ways. (Richard Riley, 1999). The United States Secretary of Education highlights the importance of curriculum implementer in mathematics, that it requires to change the repition of the topics. Teacher as curriculum designer, a good teacher provides a critical instructional design that go beyond the textbooks.

The spiral approach, the teacher is going to introduce the similar lesson in several years. The problem analysis in the implementation of spiral approach is wide number of topics are taught in the early grades and it cycle throughout the years. Therefore, the teachers are also expected to have all expertise in topics. Orale and Uy, (2018). On the other hand, the case is student is unable to gain mastery of the new topics and force to introduce new topics. Mathematics is essential academic in today's era with regard to Science and technology. (Dowling et al., 2001).

In the Philippine Educational Setting, the Department of education has recently introduced a major renovation and retouch in the

curriculum. Verzosa & Vistro-Yu, (2019). For additional two years in basic education curriculum which signifies adapted to modern dynamics. Three provisions of this new curriculum program directly relate to Mathematics education. First was the shift of language instruction in kindergarten to grade two education from English to mother tongue. Second was development of mathematics that emphasizes critical thinking and numeracy. Lastly,third the specializing non-academic track that could give extended opportunities. (Yap, R. 2011). Indeed, Education is pivotal to the life and development everyone. Furthermore, to become successful in life, teachers play important role in shaping learners. It encouraged everyone to step forward and excel in creating positive effects where recognition and achievement can be acquired.

Teachers view in the curriculum as their role and decide what to teach from the prescribe syllabus. Teachers contribute to curriculum development, interpretation. The teacher perceptions in the curriculum influence their teaching and learning decisions that provides insight into how the curriculum is implemented in the classroom. Bas, (2020). Several studies discuss about curriculum as complex phenomenon the curriculum is broader perspectives and its dynamics. (Ornstien & Hunkins, 2012; Wiles & Bondi, 2007).

The K-12 Basic Education curriculum in the Philippines known as Republic Act (10533) has various aimed.The program covers 12 years basic education, including Kindergarten and two years specialized in secondary education. It has three tracks, Academic, Technical-Vocational-Livelihood and Sports and Arts.(Quijano, 2022). therefore, the program center for the learners to improve skills in Mathematics, Science, and Linguistics,furthermore, Improve skills, prepare students for future, develop lifelong learners, connect students with the community, learners-oriented, and equip students with technological. These highlighted the quality education for all learners. Therefore, the country itself has so much efforts for educational demand and development progress. (Combalicer, 2016). To meet the globalization demands and align the country's curriculum program. Yap, (2011). K-12 Program Senior High School directly links to their achievement in Higher education (Khattab, 2015; ACC 2008; 2007. As point out (Vermulen & Schmidt, 2008). A graduate of K-12 program when landing a job highest point average GPA as most likely to be hired in the job. (Kool et al., 2016). Abueva, (2019). However, since this is new educational scheme the Filipinos, School Adminstrators, Teachers have meet some shortcomings on the knowledge and skills that requirements to meet the implementation of the K-12 Program. Curriculum design, instructions, Mastery of the subjec, seminar training, financial matters and students' attitudes. As highlighted in the Division of Nueva Ecija.

The incorporation of science across subjects and other disciplines will lead to meaningful learning in the concepts and their purpose in real-life situations. However, prospective teachers, especially those majoring in a specific discipline like biological sciences and physical sciences, face difficulties in teaching in a spiral curriculum since the science content is integrative. In fact, De Dios (2013), accentuated that human learning requires steps. We learn to walk before we run. Coherence in the curriculum is therefore a must. Coherence in a curriculum can be a given with instructors who are specialized to teach a particular subject. A teacher who has an education degree specializing in chemistry, with or without a curriculum, would know what to teach first. Hence, spiral curriculum is the best way to design learning but we have gone in the wrong implementation. (Gibs, 2014).

Mathematics teachers also doubt the effectiveness of spiral approach in teaching mathematics as Main (2012) claims that some limitations of the spiral curriculum include the risk that the curriculum becomes too crowded and rigid and that the teachers will have to re- teach concepts that were forgotten.This case was observable in the Science and Mathematics teachers of Datu Saudi Uy Ampatuan Memorial National High School. So that, this situation has prompted the researchers to conduct a study relative to these issues and concerns on the implementation of K to 12 spiral curriculum to deeply investigate the school's preparations on of the curriculum and its effectiveness to the Bangsamoro Learners. Particularly to the learners of (DSUAMNHS) for the school year 2022-2023.

Research Questions

This study aimed to explore the status of k-12 Mathematics and Science spiral curriculum. Specifically, it seeks to answer the following questions:

1. What are the preparations of school?
2. What are the problems encountered by school on implementing spiral curriculum approach?
3. What are their coping mechanisms toward the problems?
4. How relevant is the curriculum on the students' learning?

Methodology

Research Design

This qualitative research employing case study design that aimed to gather the necessary data and information regarding the status of the k-12 Science and Mathematics Spiral Curriculum in Datu Saudi Uy Ampatuan Memorial National High School.

A case study approach involves an in-depth examination to the small group of participants who can share about experiences in certain phenomenon. Where researcher allows to delineate the cases that needs to explore. (Yin, 2002)

Qualitative research talks about the study of things in their natural settings that typically produce a wealth of detailed information about much smaller number of people and cases (Patton, 1990) as cited by (Mohamad, 2022). Zaniel et al., 2023; Manakan,. et al., 2023: Pulindao, 2023; Butukan, et al., 2023). Abdillah, (2024). It is a process of naturalistic inquiry that requires in-depth understanding of

the social phenomenon within their natural setting.

Participants

The study was conducted at Datu Saudi Uy Ampatuan Memorial National High School (DSUAMNHS) located at Poblacion, Datu Piang, Maguindanao. DSUAMNHS was established on January 01, 2006. The campus consists of thirty (30) Licensed Professional Teachers and two (2) volunteer teachers but only 3 Mathematics and Science teachers were chosen to be the respondents of this study having experience teaching spiral curriculum on three sections from each year level.

Instrument

The instrument in this study was interview guide questionnaire and observation checklist. To specify, the researchers conducted Focus Group Discussion and participants were asked to share their experiences in module making. The interview guide questionnaire consists of two main parts. First question unfolds the school implementation of spiral curriculum, what are their preparations problems encountered and coping mechanisms. Second question examined the effectiveness of spiral curriculum.

Data Analysis

This study utilized Clarke & Braun thematic analysis. (2017) Thematic Analysis is a method of identifying analyzing and interpreting pattern of meaning within qualitative data. According to Teegavarapu., et al, (2008). Thematic Analysis, (TA) in case study allows researcher to identify patterns and themes within data sets that provide insight into a shared experiences or perspectives. It is usually applied to a set of texts; such as interview transcripts. The researcher closely examined the data to identify common themes – topics, ideas and patterns of meaning that come up repeatedly (Caufiled, 2020). Moreover, widely focuses on in-depth interview of particular instances like in-depth investigation of a single case or numbers of cases which offers detailed understanding complex issues in real life context Second, significant statements and phrases pertaining to school implementation of spiral curriculum were reflected in the transcript. To reflect the research data accurately, the significant statements were quoted directly.

Third, meanings were formulated from the significant statements. Each underlying meaning were coded in one category as they reflect an exhaustive description. The researchers compared the formulated meanings with the original meanings to maintain the consistency of descriptions.

Fourth, after having an agreement toward all formulated meanings, the process of grouping all these formulated meanings into categories that reflect a unique structure of clusters of themes were initiated. After clustering themes, the researcher then compared the clusters of themes and checked the accuracy of the overall thematic map.

Fifth, all emergent themes were defined into an exhaustive description. After merging all study themes, the whole structure of case "The Implementation of Mathematics and Science Spiral Curriculum" were extracted.

Sixth, a reduction of findings was done in which redundant, misused or overestimated descriptions were eradicated from the overall structure. Also, some ambiguous structures that weaken the whole description were eliminated.

Finally, the "member checking" technique was done to validate study findings using The researcher returned the research findings to the participants and discussed the results with them. The participant's then signed the validation form which indicated that they agreed with the translation of their answers during Focus Group Discussion.

Ethical Considerations

Before the conduct of the study, the researcher prepared a transmittal letter asking permission from the office of the school principal of Datu Saudi Uy Ampatuan Memorial National to conduct the study. The purpose and objectives of the study were stated in the letter of permission.

Upon the approval, the researchers coordinated to Science and Mathematics teachers of the mentioned school who are teaching spiral curriculum and asked for their cooperation and support to make the study possible by signing the consent form. After consenting the letter of invitation, the researchers and the participants set a schedule of Focus Group Discussion which was according to the preferred date of the participants as of their majority's convenient time.

After setting the date of the Focus Group Discussion, the researchers conducted Focus Group Discussion on an agreed schedule at the said school specifically at Grade 10-Rizal room. The researcher used semi-structured interviews with the use of prepared interview guide, where questions were given ahead of time so respondents would be prepared.

During the conduct of the study, participants were encouraged to talk freely and to tell stories using their own preferred words and informed the participants that the researcher will do the Audio recording and note taking for transcription purposes. The researcher of course ensure that the confidentiality of the participants' identity will be kept and will be used only for the purpose of the study. The FGD lasted for almost 1 hour. The researchers took down notes the responses of participants.

At the end of interview, the researchers informed the participants about the need for a second contact with them to discuss the findings to make sure that it reflects their own experiences, and to make the result of the study authentic and reliable.

After the Focus Group Discussion, the researchers used Clarke and Braun thematic analysis steps in case study.

Finally, the result was presented to the research experts to validate and check the credibility of the paper.

Results and Discussion

This section presents the case study data gathered to achieve the objectives of this study. The data were taken from the phone-audio recordings of the Focus Group Discussion of six (2) Mathematics teachers and 1 science teacher of Datu Saudi Uy Ampatuan Memorial National High School who were having experienced teaching spiral progression approach. These recordings were manually transcribed and translated in English. Throughout the process of identifying significant statements from each transcript of interview to formulation of meanings and clustering themes that established the surfaced patterns, themes were formulated according to the problems encountered and coping mechanism of science and mathematics teachers in spiral curriculum.

The succeeding discussion presents the result of the study as extracted from the Focus Group Discussion.

Another data presented in this chapter on the performance of students on the spiral progression approach during the research observation.

The School Implementation of Spiral Progression in Science and Mathematics

The school implementation of spiral progression in Science and mathematics is guided with the DepEd order 31, S. 2013 - Implementing Guidelines of Grades 1 to 10 to Enhanced Basic Education Curriculum

Theme 1. Adherence to DepEd guidelines

It refers to the official documents containing policies, procedures, or information released and/or signed by the DepEd Secretary or other authorized officials of the DepEd pursuant to its mandate.

"We are following the DepEd curriculum guide. Ako, when it comes to DepEd guide as much as possible specially every quarter I'll make sure na matatop ko lahat even spiral siya."

DepEd order 31, S. 2013 - Implementing Guidelines of Grades 1 to 10 to Enhanced Basic Education Curriculum which states that "the overall design of Grades 1 to 10 curriculum follows the spiral approach across subjects by building on the same concepts developed in increasing complexity and sophistication starting from grade school. Teachers are expected to use the spiral progression approach in teaching competencies.

The preparations of the School Administrators and Teachers in the implementation of Spiral Progression

Theme 1. Designing Course Outline

A Course Outline defines the course aims and learning outcomes, course requirements, textbooks, and assessment dates and criteria.

"mayron akong time schedule, may schedule talaga ako kung hanggan kelan itong ganito na topic."

This means that to ensure that both teachers and students are informed with the topics to be discussed and expected learning outcomes, they are carefully guided by the course outline. It agrees with the idea of Davies (1993). The well-designed course outline provides a solid beginning to the semester, sets the tone for the course, provides a conceptual framework for the course, serves as a "virtual handshake" between the instructor and students, and becomes a resource that is referred to over the course of the semester. It also shows students that you take teaching seriously.

Theme 2. Utilizing All Available Resources

It refers to the effort of the teachers to utilize various types of learning materials for the better understanding of the topics.

Teacher resourcefulness is operationally conceptualized in terms of the teacher to utilize the appropriate language, method, and available instructional materials to bring the best results from the learners, Banj, (1999) as cited by Okpala (2019).

First Participant pointed out that:

"Magbigay ng video kasi mahirap wala silang model, wala silang mga apparatus, so most probably nagda download ako ng mga experiments, para Makita nila, kasi wala talaga tayong diba? Para hindi sila mahuli sa anong trend"

Second participant added:

"Actually, yong mathematics ko 7 and 8. Hindi lang ako nag based dun sa book. Naga search din ako sa internet. Kasi, minsan dun sa books, puro activities. Paano masagutan ng mga bata yong sa books kung walang concepts."

This means that teachers are resourceful when it comes to teaching their specific subject loads. changes are necessary in the way mathematics is being handled. The traditional method of instruction does not relate mathematical problems to the real world, help students think about realistic situations or help them to generate their own solutions. As a result, students may become unmotivated to

learn what is unconnected with what the teacher is doing in the classroom, therefore developing an overall negative attitude towards Mathematics. (Brunner, 1996).

Problems encountered by School Administrators and Teachers in the implementation of Spiral Curriculum in Science and Mathematics

Theme 1. Less Support from The Administration

It refers to the financial support of administration in making science apparatuses and other teaching materials possible.

First participant pointed out that:

"Siguro yong malaking factors, para sa akin ay supports from the admin. Specially yong mga kailangan natin sa materials. Let us say, yong mga laptops na kailangan natin sa mga bata para naman makasabayan nila ang nasa private schools."

This means that teachers struggle in providing learning materials that would fit to the 21st century learners. Teachers' eagerness to teach in a modern way thus financial support from the administration is needed to make it possible.

Funding is needed in schools to buy more than just textbooks. Schools need proper funding to allocate the maintenance of the building, regulation codes, support staff, extracurricular activities, technology, supplies, meal plans and teacher pay. (TOFF 2020)

Financial support is one of the biggest factors that needs to be given priority because it has vital role for the success of whole institution.

Theme 2. Insufficient Educational Resources

It refers to the shortage of available teaching and learning resources. Teachers are said to be resourceful if they are able to apply all the requisite skills, competences and abilities to maximize learning outcomes and achievements, such that the results are observable in practical terms through the behavior and performance of the learner. Teachers' needs constant research for the student not to be left behind.

As one of the participants mentioned that:

"Meron naman books pero old na yon. Wala man tayong bagong ano ngayon, obsolete na ang dati nating mga materials kaya nagsesearch at nagyuYouTube."

Third participant added that:

Yung mathematics ko 7 and 8. Hindi lang ako nag based dun sa book. Naga search din ako sa internet. Kasi, minsan dun sa books, puro activities. Paano masagutan ng mga bata yong sa books kung walang concepts.

This indicates that there are available learning materials but most are obsolete and does not fit to the students' needs.

Indeed, difference levels of teacher's effectiveness are by-products of their resourcefulness and strong determinant of differences in pupils' learning. (Nwankwo, 2013, and Okpala 2019).

Theme 3. Insufficient Technical Capacity Building

Insufficient Technical Capacity Building refers to the teachers' lack of trainings on teaching spiral curriculum.

The participants admitted that they have insufficient trainings and seminars attended:

"Yan na, mag si six years na ako dito sa DSUAMNHS, wala pa akong seminars and training na napuntahan. Especially, if specialization, wala pa talaga ako. Pili lang kasi ang pinapadala sa Science, especially National Training pili lang."

"Once lang ako nagkaroon ng seminars simula ng na implement itong spiral curriculum. The rest, wala ng training, kahit sa division natin wala na. Yong iba naka ka attend ng training for their specialization sila na lang gumagastos. Meron minsan sa school inset pero about prof ed lang, like strategies, but when it comes to specialiazation, wala yata."

This means that one of the factors hindering the effectiveness of the spiral curriculum is the insufficient teachers' preparations. It implies that the conduct of technical capacity building before the implementation of new curriculum must be given priority.

Theme 4. Mastery of Subject Matter

Mastery of the subject matter refers to the teachers' proficient knowledge on the course they handle.

"Siguro sa una lang, sa una lang talaga nagkakaroon ng confusion. Actually, meron man din tayong subjects sa physics."

This means that teachers' background knowledge on the subject matter is necessary in order to give quality education.

It shows that the implementation of the spiral curriculum is not well planned since human resources specifically the teachers who will be in the field were not being considered in the planning and crafting of the curriculum. Teachers involvement is necessary.

Theme 5. Low Level of Students Performance

Low Level of Students Performance can be defined as: Low or weakness of the student's mark under the normal average, insufficient background knowledge and low retention skill which lead to merely repetition of topics rather than implementing spiral progression.

In fact, one of the participant confirmed that:

"Mabagal yan, kailangan mong ulit-ulitin sa mga bata, so hindi naaabot sa part ng curriculum. Pagdating nila sa grade 8, magiging problema mo yon, kasi hindi mo naubos yong Grade na curriculum, yan ang nagiging problema namin…. Kasi hindi ka makakaproceed sa Grade 8 mo na topics kung meron kung meron kang lacks sa Grade 7." Another participant agreed:

"Kung curriculum lang naman ang habol natin na matapos.. walang problema sa atin yon, kaya yon. Pero sa mga bata, hindi nila kaya."

Theme 6. Congested Topics

Congested Topics mean too many subjects squeezed into a short period of time. As one participant explained:

"Kung titingna mo… 300+ topics sa curriculum guide where as 202 or 204 lang number of school days natin. Hindi pa kasali ang mga activities sa school. So, hindi natin yan mako-cope up… Everyday mag another topic ka? Sa spiraling, naka chop-chop pa naman, so kailangan mong balikan yong mga lacks mo bago mo ma proceeds:.

Third Participant added:

"hindi naman pwedi na sige ka lang mag proceed ng mag proceed yong mga naunang topic hindi naiintindihan… useless din".

Coping Mechanisms toward the Problems Encountered on the Implementation of Spiral Curriculum.

Theme 1. Use of Teachers' Personal Fund and Resources.

Teachers' use of personal fund resources refers to the initiative of teachers to address the problem on the lack of funding by dipping into their own pocket.

First Participant pointed out:

"Buying, projector with my own expense. Kasi, need natin talaga para maging quality ang teaching natin sa mga bata, para madali nilang maintindihan ang mga tinuturo mo."

It confirmed by Sarmiento, (2021) on her study stated that Public school teachers are spending money from their own pocket to buy gadgets computer as laptop computer, and mobile phone, and to avail internet connection services to facilitate teaching and learning.

Theme 2. Resourcefulness

It refers to the effort of the teachers to utilize various types of learning materials for the better understanding of the topics.

Teacher resourcefulness is operationally conceptualized in terms of the teacher to utilize the appropriate language, method, and available instructional materials to bring the best results from the learners, Banj, (1999) as cited by Okpala (2019).

Second participant responded

"Gumagamit kami ng other resources, like books na specific sa math, nag re-research din kami sa internet, especially sa YouTube."

Third participant affirmed it:

"Maraming tutorial sa YouTube, need lang natin e search yong mga topics. kumukuha din ako ng mga libro sa mga private schools as reference, at para na rin maka bench mark sa mga laboratory activities nila. Sa youtube, dina download ko para advance nilang mapanood… para magkaroon sila ng advance na idea."

Theme 3. Pursuing Post Degree Program

Pursuing Post degree program refers to the teachers' dedication to serving quality education to the learners, and assuring continuous learning so she they cope with the changing learning styles and demands.

Theme 4.1 Contextualization

Contextualization refers to the teachers' ability in paraphrasing the content of the spiral curriculum for it to be more appropriate to the level of their learners.

Evidently, third participant stated that:

"I tried na sundin talaga ang nasa CG (Curriculum Guide) di talaga siya kaya sa level ng mga bata. Especially sa case ng mga slow learners. So, nag contextualize na lang ako para may matututunan ang mga bata."

This means that teachers considered the background and level of the students so he had to contextualize the learning material into a simpler and easier for better understanding of the low level students.

Theme 4.2. Differentiated Instruction

It refers to the teachers' approach and strategy to address the diverse class. In fact, first participant stated that:

"ang ginawa ko. Iba ang approach sa ganitong level ng student at iba naman ang approach don sa iba. Example, itong section, ganito ang approach. Then, other section ganito naman ang approach."

Theme 5. Most essential leaning competencies (MELCs).

Refers to the teachers coping mechanism on the problems on congested competencies for the whole school year which was initiated and ordered by the Department of Education

As one participant mentioned that:

"During pandemic, marami silang tinanggal, at yon na si Most essential leaning competencies (MELCs)."

According to DepEd, MELCs are defined as what the students need, considered indispensable, in the teaching-learning process to build skills to equip learners for subsequent grade levels and subsequently, for lifelong learning. On the other hand, desirable learning competencies were defined as what may enhance education but may not be necessary in building foundational skills (Brayan 2020).

This means that MELCs enable teachers to focus instruction to the most essential competencies that all learners must acquire.

Table 1. *Effectiveness of Spiral Teaching and Learning Practices Checklist*

Effective Sprial Teaching and Learning Practices Checklist				
Item No.		*Teacher A*	*Teacher B*	*Teacher C*
1	The teacher exposes the learners to a wide variety of concepts/topics, skills and attitudes that are deemed of "Continual concern of everyone" until they are manifested	⎫		⎫
2	Key concepts are presented repeatedly throughout the curriculum, but with deepening layers of complexity."	⎫	⎫	⎫
3	Students are able to reinforce what is already learned.			
4	Student's rich breadth and depth of knowledge are achieved.			
5	The previously learned concept is reviewed hence improving its retention.	⎫	⎫	⎫
6	The topic is progressively elaborated and it is reintroduced leading to a broadened understanding and transfer of learning.			⎫
7	Students' performances of understanding explicit.			
8	The teachers facilitate their students to learn from experience, activities and work, leading to the development of learners in all aspects physical, mental, emotional, social, and intellectual.	⎫	⎫	⎫
9	The students are able to transfer their learning from one context to another which required students to learn the fundamental principles of subjects and explore ideas on a deeper level rather than just mastering facts and rote learning procedures.			
10	The teacher move upward but keeps returning to the fundamentals.	⎫	⎫	⎫

Based on the findings of the observation, it can be seen that the teacher-participants were able to do the checklist of the effective spiral teaching and learning practices. For Teacher A, he/she attained or met item 1, 2, 5, 8 and 10. For Teacher B, He/She only attained (4) items, the item 2, 5, 8 and 10. Whereas, Teacher C attained or met (6) items, the item 1, 2, 5, 6, 8, and 10.

Based on the result of finding of observation checklist it can be concluded that the implementation of K to 12 Science and Mathematics Spiral Curriculum in Datu Saudi Uy Ampatuan Memorial National High School is not effective in the level of the learners. In the teaching process, as much as possible, teachers find ways in the delivery of instructions. Evidently, they did the following items from the observation checklist in the realization of the implementation of spiral curriculum but the level and ability of the students are still negotiated.

The teacher exposes the learners to a wide variety of concepts/topics, skills and attitudes that are deemed of "Continual concern of everyone" until they are manifested

Key concepts are presented repeatedly throughout the curriculum, but with deepening layers of complexity."

The previously learned concept is reviewed hence improving its retention.

The topic is progressively elaborated and it is reintroduced leading to a broadened understanding and transfer of learning.

The teachers facilitate their students to learn from experience, activities and work, leading to the development of learners in all aspects

physical, mental, emotional, social, and intellectual.

The teacher moves upward but keeps returning to the fundamental.

Conclusions

Based on the context of DSUAMNHS, the teachers adhere to the Deped Guidelines as accord to implementation of Spiral Curriculum in Mathematics and Science. The have encountered problems in the implementation such as less support from administration, lack of educational resources, insufficient technical capacity building, mastery of subject matter, low level of students' performance and congested topics but they addressed these problems through Resourcefulness, Use of Teachers personal fund and resources, pursuing post degree program, contextualization, differentiated instruction and Most Essential Learning Competencies.

Based on the data gathered, it implies that teachers struggled on the k12 curriculum, that teachers background knowledge and readiness should be given priority. Teachers should have attended several training on this curriculum to be an effective one.

MBHTE may design several training to strengthen teachers competitiveness.

Administration should at least show support to the teachers and work collaboratively for better outcomes.

Teachers should initiate on how to cope with the dynamic curriculum to be an effective teacher.

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