Junior High School Teachers' Adaptation on the K-12 Science Spiral Progression Curriculum: Inputs to Teaching Approaches for Countryside Learners

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Abstract: *Teaching in the new curriculum is accompanied by several changes. Being able to adapt to those changes means being able to impart learning to the students effectively. Thus, this study aimed to investigate the experiences of junior high school science teachers in adapting the spiral progression in teaching science. The researcher used a qualitative method with a phenomenological design. In-depth interviewing was the main strategy used in this study. The gathered data were categorized to produce major themes and formulate meanings. The analysis of data in this study was patterned on Colaizzi's phenomenological descriptive method. In this study, it was found that teachers have a hard time adapting to spiral progression in teaching science; however, teachers have tried their best to adapt to the new curriculum by employing different adaptation strategies, such as the use of constructivist teaching approaches, creating their own learning materials and activities, studying new science concepts, and attending seminars. Overall, based on the findings, there is still a need to closely monitor the use of the spiral progression approach in the new curriculum since issues and challenges are still encountered by teachers even if it was implemented six years ago.*

I. INTRODUCTION

Humans are subjected to numerous changes in their environment, which necessitates adaptation and coping. Adaptation is the ability to adjust to new information and experiences; thus, Piaget (1952) regarded intellectual growth as a process of adaptation or adjustment to the world (McLeod, 2007). The concept of adaptation happens anywhere with the purpose of improving one's function. Thus, it is experienced not only by students but also by many teachers and educators nowadays. This is primarily due to the fact that the educational system has undergone a series of changes as a result of globalization (Lacorte, 2013). In 2012, the Philippines implemented the K-12 curriculum, thus indicating the need for educators to adjust and adapt to the new changes in education.

In the implementation of the K–12 curriculum, a new approach was given emphasis, which, according to Adanza and Resurreccion (2015), resulted in teachers having a tough time adjusting to or adapting to the new curriculum. As Kardena (2015) emphasized, teachers' understanding of the new curriculum (including its new concepts and approaches) is essential because it directly influences their performance in the classroom. Thus, emphasizing that if teachers are unfamiliar with the current curriculum, they will undoubtedly face difficulties at work,

The enactment of the new curriculum resulted in the use of a spiral progression approach, which brought about a series of changes in the manner of teaching. Science is one subject that has seen significant changes (Montebon, 2014). Biology, General Science, Physics, and Chemistry were previously divided to each year level in high school, allowing students and teachers to focus solely on one discipline and ensuring subject retention (Dinglas, 2017). However, in the new curriculum, science concepts are presented in a spiral approach (SEAMEO INNOTECH, 2012), wherein, according to Ferido (2013), the content and the arrangement in this approach are developed in such a way that the skills and the topics or lessons are revisited every year level with increasing complexity. Therefore, teachers are

now faced with the dilemma of juggling multiple branches of science in one school year.

As mentioned by De Dios (2013), with the implementation of the spiral curriculum, teachers are required to have sufficient familiarity in all science areas. With that, teachers will have a hard time discussing topics that are new to them. As emphasized by Dinglas (2017), since teachers are trained to teach one specific branch of science, no matter how relative the four sciences are, there will still be a noticeable difference in the manner of instruction or in the completeness of ideas and principles. Additionally, according to Snider (2004), all topics are given equal time, regardless of whether they are easy or difficult to master. Thus, there are some days when there will not be adequate time to introduce new concepts, making it difficult for the teachers to teach more complex science topics.

The implementation of the K-12 Science Spiral Curriculum changed the teaching field, particularly the teaching approaches and strategies. With that, the researcher was encouraged to conduct the study to investigate and explore the experiences of junior high school science teachers in adapting the spiral progression in teaching science. This study was conducted in a secondary school in a province in Eastern Visayas, the Philippines. It consists of approximately 200 teachers, and 25 of those belong to the Science Department.

II. METHODOLOGY

Research Design

This study used a qualitative method, specifically a phenomenological approach. This is to investigate the experiences of junior high school science teachers in adapting to or coping with the spiral progression in teaching science. Phenomenology is a qualitative research approach that defines the meaning of a lived experience of a phenomenon for several people, which is the experience of junior high school teachers in adapting the Spiral Progression Approach in teaching science in this study. This research used in-depth interviews as the strategy for the phenomenological approach.

Research Samples

Participants for this study were selected by purposive sampling and consisted of junior high school science teachers in a secondary school from a province in Eastern Visayas. Purposive sampling is the main technique used in a qualitative method of research and was the sampling technique used in this study to select the participants.

In this study, fifteen (15) participants reached the saturation point. Saturation happens when the addition of more participants to the study does not result in additional perceptions and information, meaning that it is the point wherein the data collection process no longer offers any new data.

The researcher also made a checklist of the selection criteria for the participants of this study: a) respondents or participants were required to be junior high school science teachers; b) they belong to one school; and c) they are willing to be interviewed in connection with the study.

Data Collection Method

The researcher wrote a letter of approval to the principal, asking for permission to conduct an in-depth interview with the target participants. The letter of approval was presented to other authorities involved in this study. After the letter was approved, the researcher conducted an in-depth interview with the junior high school science teachers. All the participants were informed about the purpose and aim of this study, and thus, informed consents were solicited for the participants' involvement. Also, the researcher asked permission from the teacher-respondents to record their responses during the interview.

Moreover, a semi-structured interview guide was used in the in-depth interview process. The expected responses of the participants were written in the interview guide to serve as a guide for the researcher to formulate follow-up questions. The researcher coordinated with the principal and department head of the science department in the making of the schedule for the interview. There were 14 female participants and one male participant, a total of 15 participants for the interview.

The in-depth interview was personally facilitated and conducted by the researcher herself. It was conducted for 20 to 30 minutes in order to get the comprehensive information needed for this research. Furthermore, the participants were allowed to speak in English, Filipino, and Waray-Waray languages during the conduct of the interview. However, throughout the conduct of this study, the English language was used by the participants. The interview and gathering of data were conducted during the vacant time of the teacher-participants.

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This research study used a semi-structured interview guide. It consists of semi-structured open-ended questions and was first validated through the following procedures: Initially, the draft of the semi-structured interview guide was submitted to the research adviser for content validation, where the latter indicated corrections, suggestions, and recommendations for the refinement of the content. Upon incorporation of all the adviser's corrections, suggestions, and recommendations, the semi-structured interview guide was presented to the panel members and to two science teachers. The validators were chosen for their expertise in the research and science fields. Then, the comments, suggestions, and recommendations of the members of the expert validation panel for the research instrument were considered and incorporated.

The semi-structured interview guide consisted of the research and interview questions, which were patterned from a sample interview guide in a study made by Gal (2018) in her study entitled "Performance of Senior High School Students in the Spiral Progression Approach of the K to 12 Science Curriculum," in the research study of Adanza and Resurreccion (2015) entitled "Spiral Progression Approach in Teaching Science in Selected Private and Public Schools in Cavite," and in the study of Samala (2018) entitled "Spiral Progression Approach in Teaching Science: A Case Study"

Data Analysis

The data analysis in this study was patterned on Colaizzi's phenomenological descriptive method (Alzayani, 2015), as shown in Figure 1:

Figure 1

Collaizi's Phenomenological Process

In this research study, Colaizzi's process for phenomenological data analysis was used as follows: (1) each transcript of the data gathered was read and re-read to acquire an overall idea about the content; (2) significant and relevant statements were extracted from each transcript and recorded in a separate paper; (3) relevant meanings were created from the formulated statements; and (4) formulated relevant meanings were sorted into categories, clusters, and groups; (5) the findings were integrated into a comprehensive description of the phenomenon; (6) the researcher identified the essential structure of the phenomenon; and (7) the results, were validated by returning to participants and showing them the results in order for them to compare and examine the research study's descriptive results with their own descriptions of the phenomenology.

Ethical Consideration

All participants received oral and written information about the objective of the study and the possibility of withdrawing their participation at any time without having to give reasons for doing so. During the in-depth interview, the participants were informed that their responses would be recorded. In addition, the recording was kept safe until it was properly translated word for word.

After which, the recording was deleted. The transcribed notes of the in-depth interview did not contain any confidential or personal information that would allow people to be linked to any statement or answer. In the questionnaire, the respondents were also given the choice of writing their names or not, as the word "optional" for names was emphasized in the document. The participants were assured that the discussion would be confidential.

III. RESULTS AND DISCUSSION

Demographic Information of Teacher-Participants

Table 1 provides the demographic information of teacher-participants to serve as proof that the researchers considered some inclusion criteria for the study participants. The demographic information allows the readers of this study to better understand certain background characteristics of study participants for a general purpose.

Table 1

Demographic Information of Teacher-Participants

Participant	Age (yrs)	Sex	Civil Status	Highest Educational Attainment	Field of Specialization	No. of Years in Teaching	Designation/ Rank
Teacher 1	43	F	Widow	BS Degree Holder with Master's Degree Units	General Science	18	SST III
Teacher 2	32	F	Married	BS Degree Holder	Biology	2	SST I
Teacher 3	27	F	Married	BS Degree Holder with Master's Degree Units	Physics	3	SST III
Teacher 4	58	F	Married	BS Degree Holder	Biology	30	SST II
Teacher 5	33	F	Separated	Master's Degree Holder	Biology	8	SST III
Teacher 6	36	F	Married	BS Degree Holder with Master's Degree Units	Biology	4	SST III
Teacher 7	43	F	Married	BS Degree Holder with Master's Degree Units	Biology	25	Master Teacher I
Teacher 8	47	F	Widow	BS Degree Holder with Master's Degree Units	Chemistry	23	SST III
Teacher 9	28	F	Married	Master's Degree Holder	Physics	5	SST II
Teacher 10	46	F	Married	BS Degree Holder with Master's Degree Units	Physics	14	SST II
Teacher 11	40	F	Married	BS Degree Holder	Chemistry	11	SST III
Teacher 12	43	F	Married	Master's Degree Holder	Chemistry	19	SST III
Teacher 13	50	F	Married	BS Degree Holder	Chemistry	15	SST III
Teacher 14	27	F	Single	Master's Degree Holder	Physics	6	SST III
Teacher 15	31	M	Single	BS Degree Holder	Biology	2	SST I
Teacher 16	47	F	Married	Doctorate Degree	Educational Management	24	Master Teacher II
Teacher 17	63	F	Married	BS Degree Holder	General Science	30	SST III
Teacher 18	45	F	Married	Master's Degree Holder	General Science	19	Master Teacher II
Teacher 19	48	F	Widow	BS Degree Holder with Master's Degree Units	General Science	22	Master Teacher I
Teacher 20	49	F	Married	BS Degree Holder with Master's Degree Units	Chemistry	23	SST III
Teacher 21	53	F	Married	BS Degree Holder with Master's Degree Units	General Science	26	Master Teacher I
Teacher 22	45	F	Married	BS Degree Holder with Master's Degree Units	General Science	10	SST II
Teacher 23	55	F	Married	BS Degree Holder with Master's Degree Units	Biology	20	SST III
Teacher 24	60	F	Married	BS Degree Holder	Chemistry	28	SST III
Teacher 25	60	F	Married	BS Degree Holder with Master's Degree Units	Biology	27	SST II

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Participants' Knowledge on Spiral Progression

The teacher-participants (T) expressed their ideas about Spiral Progression. Among those ideas that appeared from the responses of the teacher-participants are:

> *"I observed that, there is increasing depth of science concepts at each grade level."* ***(T5)***
>
> *"The science competencies or content are from simple to complex."* ***(T6)***
>
> *"From basic to difficult topic. Increasing in difficulty up to grade 10."* ***(T7)***
>
> *"All the subjects that are taken up in first year to fourth year is being taken up now in first year but the easier topics are being discuss in the first year and then progressing to fourth year."* ***(T15)***

Tan (2012) defines spiral progression as the development of similar topics from one grade level to the next in increasing difficulty. Furthermore, as mentioned by Gatdula (2016) in an article entitled "Embracing the Spiral Progression Approach of the K–12 Program," spiral progression implies that basic concepts are discussed in the first grade and are revisited in the next grades in more intricate forms. Thus, participants can distinguish the meaning of spiral progression.

Participants' Adaptation to K-12 Spiral Progression Curriculum

Theme 1: *Constructivism in science classroom*

As emphasized by Resurreccion and Adanza (2015), teachers need to improve by changing their way of teaching and learning to adapt to the spiral progression approach. Adaptability is the ability to adapt to new changes, and according to Collie and Martin (2016), this is a central capacity for teachers. This includes the capacity to manage new, changing, and undefined events that occur.

Participants emphasize the use of constructivist teaching approaches (e.g., discovery approach, guided learning) in teaching science as one adaptation technique they employ in teaching under the spiral progression curriculum. As highlighted by Molina (2019), in constructivist learning, teachers give minimal supervision and maximum opportunity for the learners to learn and apply their new knowledge. The participants have agreed that using the discovery approach and other constructivist teaching approaches have helped them cope with the new science curriculum.

> *"Discovery Approach ... Learning by doing – where students are able to learn based on their activity***" *(T1, T2, T12)***
>
> *"Group activity, Peer teaching/ mentoring, Integration of ICT like video presentation"* ***(T3, T10, T11, T13, T14)***
>
> *"The same approaches such as laboratory activities and discussions"* ***(T4, T5)***
>
> *"Guided inquiry-based approach. In which the teacher scaffold or guide the learner through instruction in answering or solving science problems."* ***(T6, T8)***

Theme 2: *Develop additional learning materials and activities*

Four of the participants said that they make their own learning materials and activities for students, especially on difficult concepts when adapting to the new curriculum. This scenario could be affirmed by Mileszyk (2015), who stated that teachers are ready and willing to create educational materials. This is mainly because learning materials are vital for the success of students, so these can support student learning and increase student achievement. In a spiral progression curriculum, teachers are willing to make their own learning materials just so their students will be able to learn concepts, especially the complex ones. Moreover, making instructional or learning materials that fit or suit the interests of the students helps with the retention of science concepts (Samala, 2018).

> *"And make instructional materials for difficult topics since what is written in the book is difficult."* ***(T1)***
>
> *"Develop instructional materials especially for difficult topics."* ***(T8)***
>
> ***"****Develop different games to get their attention and interest in our lesson."* ***(T9)***

"Me, since I'm handling higher sections, I supply, I conduct supplementary activity. I don't usually follow the activity written on the book. I do my own." ***(T14)***

Theme 3: *Studying new science concepts and topics*

Participants believed that studying on their own was a big help for them in coping with the application of the spiral progression approach in the teaching process. According to Esperanca (2018), the best thing about teaching is learning. That is why teachers do not stop acquiring learning or knowledge, especially when adapting to the new curriculum. As the teachers emphasized, they had no choice but to study new concepts in order to cope with the present curriculum. Furthermore, Buan (2018) emphasized that the curriculum's movers, or teachers, must be competent enough to assist students. Thus, the teachers need to understand the subject matter deeply so that they can impart learning effectively.

"Study the different science concepts." ***(T5, T12)***

"Advance study topics which are not my major." ***(T7)***

"For me, for professional development, although it's really difficult and hard for me to study another science concepts and topics especially that we're getting old… so our memory decreases, deteriorating. But at the same time, I feel joyful learning new science concept, I appreciate that only that it is really challenging to study again …but when I learn those topics, it is a great feeling …once you know it is very enjoyable and interesting." ***(T10)***

"We have no choice but to study. Because it is a shame on our part standing in front of your students then they will give questions and you don't know the answer." ***(T11)***

"You have no choice but to study…I am actually honest with my students, I told them I am not a physics teacher… It is only my 4 …or 3rd year in teaching physics. In my high school, my waterloo is math and physics, so do not expect me to be very good in this subject." ***(T13)***

Theme 4: *Attend trainings/seminars/workshops*

Participants emphasized that it is important to attend trainings and seminars for knowledge updates. As pointed out by Samala (2018), educators must have mastery of their subject matter in order to be equipped to teach science, and that is done by allowing them to attend workshops and trainings so that their knowledge and skills in different science areas will be improved.

"There must be trainings and seminars for teachers." ***(T1, T2, T4, T13)***

"Science teacher should be given trainings, seminars or workshops in order to master other science subjects." ***(T6)***

"Seminars should be provided to all teachers by the government." ***(T8)***

"As of now, since it has been 3-4 years that K-12 has been in our country, maybe the teachers are still adjusting for us to impart better knowledge to the learner. I recommend to give trainings for the teachers to effectively deliver lessons." ***(T9)***

"*We Attended seminars…"* ***(T11, T15)***

"Firstly, teachers should be fully-equipped since we are the front liners. One way to improve our professional development, is that the government should spend money, I think the government should spend scholarship, conduct trainings and seminars for teachers. Because we are the manpower, we are the front liners. How can we give something that we don't have?" ***(T12)***

"I suggest that the government should provide more seminars for the teachers in teaching science in the K - 12 spiral progression curriculum." ***(T14)***

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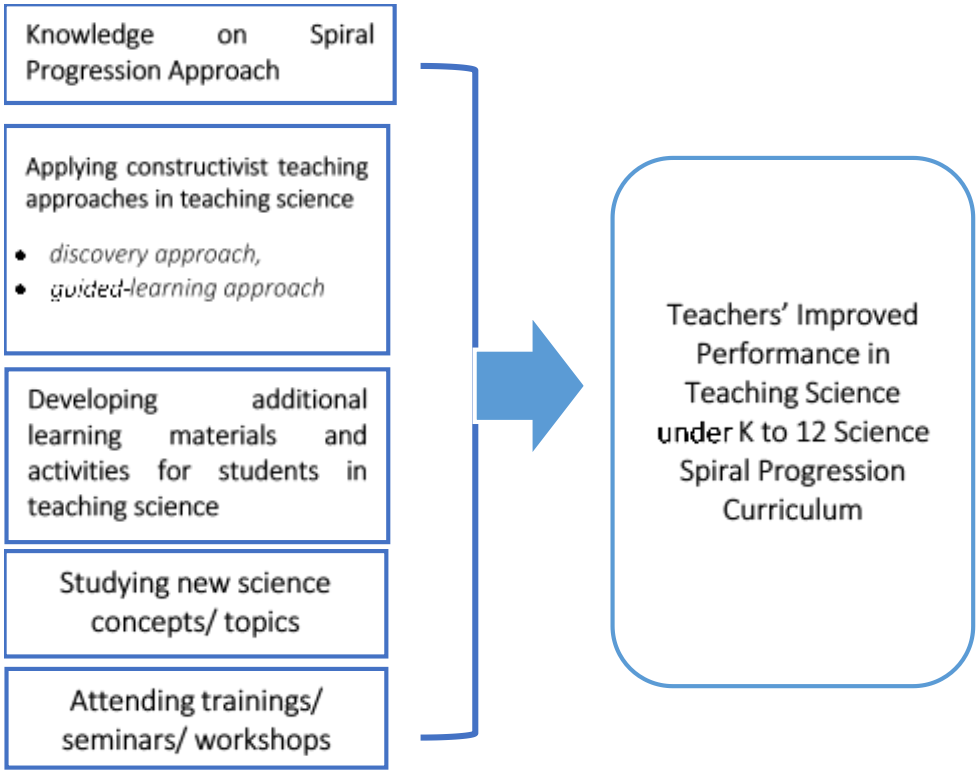
Figure 2

Conceptual Model of Junior High School Teachers' Adaptation in Teaching Science under the K–12 Spiral Progression Curriculum



IV. CONCLUSION

The study participants, who are teachers in a rural area of Samar, Philippines, deemed that adapting the K-12 science progression curriculum by using constructivist learning approaches, creating their own learning or instructional materials and learning activities, studying new and relevant science concepts, and attending trainings and seminars were ways to adapt to the change in the new science curriculum. Although the study's limitations only allow for qualitative data analysis, it is suggested that sufficient information about the adaptation's implementation be explored. In the long run, additional professional training and seminars for teachers would best assist them in adapting to the spiral progression curriculum.

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