A Scoping Review on the Implementation of the Spiral Progression Approach

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Abstract: The recent curricular reform launched in the Philippines used the spiral progression approach in organizing the contents of the subjects in the K-12 curriculum. Despite its theoretical bases, there have been contradictions to the implementation of a curriculum organized using the spiral progression approach. This study aims to provide a comprehensive view of the spiral progression approach, i.e., teaching strategies and methods employed, teachers' and students' perceptions, empirical educational outcomes, and recommendations in improving its implementation. Using Arksey and O'Malley's (2005) scoping review framework, results indicate that 1) learner-centered teaching strategies and methods are employed, 2) teachers and students both have positive and negative perceptions towards its implementation, though they too have more pessimistic views, and 3) a spiral curriculum generally produce positive results, though there are noted exceptions. The implementation can be improved through the enhanced curriculum and pedagogical knowledge of teachers, and improve the various instructional procedures taking place inside the classroom for mastery learning.

1. Introduction

In the Philippine The spiral progression approach traces back to Jerome Bruner's idea of the spiral curriculum in his book "The Process of Education" (Bruner, 1977). Bruner argued that teaching should be aimed towards boosting the learners' cognitive development and proposed that children can learn even the most complex material if it is properly structured and presented (Corpuz & Lucas, 2014). The teacher's role should scaffold the learners' readiness and translate given information into a format appropriate to the learners' current developmental state (Corpuz & Lucas, 2014; Johnston, 2012). Moreover, the curriculum should be constructed in a spiral manner to allow students to continuously build upon their current knowledge (Corpuz & Lucas, 2014). For instance, children in elementary may be introduced with different kinds of living things that are found in different places. As they proceed to higher grade levels, they will be presented with their common characteristics as the basis for classification and even, later on, the mechanisms of how the species of living

things came about through natural selection and survival (Department of Education, 2016). In a spiral curriculum, fundamental structures of the disciplines, e.g., essential concepts and relationships, will serve as the focal points of the curriculum and should be revisited constantly to promote deeper understanding as the learners advance in his/her course of study (Howard, 2007; Kolomitro, Inglese & Idzikowski, 2017).

A gradual increase in the competence of the students takes place as they revisit the topics and achieve new learning targets (Harden & Stamper, 1999). In addition, spiral progression approach entails integration and cohesion of knowledge, thus, making it interdisciplinary and filling the inadequacy of compartmentalized approach (Aquino, 2015; Corpuz & Salandanan, 2015). Considerable venues are identified for developing themes in which different subjects can be integrated, allowing students to weave connections between them (Aquino, 2015; Corpuz & Salandanan, 2015). Essentially, spiral progression captures the important concept of cumulative learning (Lee, 2012).

In curriculum development, the spiral progression approach has a strong association with learning theories and educational philosophies (Corpuz, n.d.; Corpuz & Salandanan, 2015; Pawilen, 2015; Resurreccion & Adanza, 2015). In Jean Piaget's cognitive development theory, learners acquire new knowledge through the processes of assimilation and accommodation (Corpuz, Lucas, Borabo & Lucido, 2015). Socio-cultural theory of development, e.g., more knowledgeable other (MKO), is recognized as the teacher plays an important role in assisting the learners by structuring information into a format that suits to their current level of development. David Paul Ausubel's theory on meaningful verbal learning and principle of progressive differentiation provide the notions on the hierarchical organization of knowledge - general ideas of a particular topic should be taught first, followed by the more specific ideas (Corpuz & Lucas, 2014), reflect the spiral curriculum. Philosophically, constructivism prominently backs up the spiral curriculum which primarily believes in the idea of the active and dynamic process of learning, i.e., learners acquire new learning based on current/prior knowledge (Corpuz & Lucas, 2014; Resurreccion & Adanza, 2015).

Other philosophies which are related to the spiral progression approach are progressivism and behaviorism (Resurreccion & Adanza, 2015). A spiral curriculum also embodies the principle of continuity (Oliva, 2004). Pawilen (2015) hints that the vertical organization of a curriculum focuses on the spiral progression of contents. Moreover, horizontal organization is accounted through the extension, reinforcement, and broadening of each revisited concept, as well as through its interdisciplinary nature (Corpuz, n.d.; Corpuz & Salandanan, 2015).

In the Philippine setting, the spiral progression approach has been employed in the K-12 curriculum (R.A. 10533, 2013). This curricular reform aimed to improve the quality of basic education in the country (Bilbao, Dayagbil & Corpuz, 2015). One of the standards indicated in Section 5 (Curriculum Development) of R.A. 10533

states that "the curriculum shall use the spiral progression approach to ensure mastery of knowledge and skills after each level". Based on the K to 12 toolkit, SEAMEO-INNOTECH (2012) reiterated that the approach contributes to the seamless nature of the curriculum by ensuring a "smooth transition between grade levels and continuum of competencies" (p. 4) and guarantees integration of learning across grade levels and learning areas.

Spiral progression approach is used in the structuring of the K-12 curriculum for the following justifications: it avoids incoherence between levels of schooling, lessens overlapping and 'jumping' arrangement of topics in various levels, caters the grounds for continuity and consistency, promotes learner-centered approach, emphasizes formative and authentic assessment, allows flexible sequencing of content per quarter, and helps clarify misconceptions (Cabansag, 2014; Resurreccion & Adanza, 2015; Tan, 2012). It is also seen as one of the means to be at par with the curriculum of high-performing countries such as Australia, Finland, Japan, Singapore, and New Zealand (Pawilen, 2015; Tan, 2012).

The spiral progression approach, arguably, presents an impressive background. However, there have been contradictions to its effectiveness, i.e., relatively few empirical evidences, low achievement scores, and problems in its implementation (Alwardt, 2011; Johnston, 2012; Resurreccion & Adanza, 2015). It is also prone to the risks of rigid curriculum and the re-teaching of content instead of building up on their previous lessons (Drew, 2020). There is a need to examine current literature of the spiral curriculum at various levels, e.g., student-level, teacher-level, or even in the policy-making level variables using scoping review methodology.

Here we report scoping review to determine the breadth of the literature of spiral progression (Arksey & O'Malley, 2005; Munn, Peters, Stern, Tufanaru, McArthur & Aromataris, 2018). The methodology has started to become widespread, which involves choosing a particular area of interest, condensing significant, existing information from current literature, and then drawing conclusions (Levac, Colquhoun & O'Brien, 210; Guden & Bellen, 2020; O'Flaherty & Phillips, 2015; Pham et al., 2014). Scoping reviews are also seen as effective precursors of doing systematic reviews, a similar methodology that involves assessing the quality of evidences in the examined literature.

Using the scoping review methodology helps clarify the concerns surrounding the spiral progression approach and refine future research inquiries. In adopting the Arksey and O'Malley (2005) framework, the following can be achieved: 1) the degree and nature of research activity on the topic of the implementation of spiral progression approach may be examined, (2) the necessity of undertaking a systematic review for the said curricular approach may be determined, (3) research findings on the topic will be summarized and circulated and finally, (4) potential research gaps may also be identified. Also, it may help identify key characteristics that relate to the topic at hand and clarify key concepts in the available

literature (Munn et al., 2018). Results of the scoping review provide significant insights to teachers, school leaders, curriculum specialists, and other stakeholders.

2. Objectives

This study aimed to methodologically summarize a range of evidence that discusses the implementation of spiral progression approach with the use of scoping review. Specifically, this study aimed to attain the following objectives:

1. Identify the common teaching strategies and methods used in a curriculum designed using the spiral progression approach.
2. Determined the students' and teachers' perceptions in the implementation of a curriculum organized using the spiral progression approach.
3. Distinguish the educational outcomes and impacts among students in implementing a spiral curriculum.
4. Generate the suggestions or recommendations to improve the implementation of a curriculum organized using the spiral progression approach.

3. Methodology

Scoping review undertakes the stages of a rigorous, reflexive, and transparent manner and its explicitness allows further replication, increased reliability, and response to any suggestion of deficiency (Arksey & O'Malley, 2005). The five main stages were (1) identifying the research questions, (2) identifying relevant studies, (3) study selection, (4) charting the data and lastly, (5) collating, summarizing, and reporting the data.

3.1. Identifying the Research Questions

Nye, Brunton and Wendt (2016) suggested that a research question should be a clear, answerable, and investigative statement that directs the review processes. Moreover, a set of these questions should establish key domains to be explored and limitations to be considered (Nye, Brunton & Wendt, 2016). To ensure a comprehensive and manageable coverage of literature, the following research questions were presented in the previous section.

3.2. Identifying Relevant Studies

Key search terms were developed to cover a wide coverage of literature (Table 1). In the intent of capturing a comprehensive number of studies in the identification of primary literature, and cognizant of the practicalities of time and other constraints, inclusion and exclusion criteria were developed (Guden & Bellen, 2020). These eligibility criteria function to present a basis of validation for selecting studies to be included in the review and to reduce the bias in the process (Nye, Brunton & Wendt, 2016). The researchers considered almost two decades given that the spiral progression approach began decades ago.

Table 1. Key search terms

Search terms
Spiral "curriculum" or "progression approach"
Effectiveness of spiral "curriculum" or "progression approach"

Table 2. Inclusion and exclusion criteria

Criterion	Inclusion	Exclusion
Time period	2000 to 2018	Studies beyond these dates
Language	English	Non-English studies
Type of article / publica-tion	Journal articles, conference papers, doctoral thesis/dissertatio ns	Articles that are not published in journals, not presented in a conference, or not a doctoral thesis/dissertation
Study focus	Students and teachers in basic education. Participants who engage in the implementation of the spiral progression approach	All other students and educational settings
Litera-ture focus	Articles in which spiral progression approach has a significant bearing or emphasis	Articles that simply made a passing reference to spiral progression approach Articles that were crafted from personal opinions or editorials or discussion.
Popula-tion and sample	Students who are enrolled in formal and recognized schools or programs in basic education. Teachers who implement a curriculum designed using the spiral progression approach.	All other students who are not enrolled in a formal and recognized school or program in the basic education level and teachers of any institution that does not utilize spiral progression approach

Electronic databases were used as primary sources of useful studies in this scoping review, which usually include abstracts and bibliographic details of published researches. There were 13 electronic databases used to glean for relevant literature and studies, namely: Google Scholar, ERIC, DOAJ, CiteSeerX, Microsoft Academic Research, Zenodo, BASE, JURN, SSRN, ScienceOpen, Web of Science, Figshare and Researchpedia. A search on Google was also done. Reference lists or bibliographies of certain studies were also checked to gather more studies to be included. It took two months to complete the search for related studies and materials, ending in March 2019, which encompassed both peer-reviewed and grey literature.

3.3. Study Selection

After searching for articles through databases and reference lists, there were 165 records identified. The initial procedure involved the removal of duplicates (n=28) because some journals may be indexed in different databases. After the preliminary screening, 77 records were excluded due to reasons of relevance, date, and study scope. This left 60 articles to be assessed for final inclusion in this scoping review. After the second stage of screening, which involved reviewing full-text articles for further analysis, 45 records were ruled out for the grounds of the type of article, population, and apparently, the availability of the full-text articles. For this time, a greater part of the excluded articles looked into spiral curricula that are implemented in different programs in higher education. Overall, 15 articles were identified as relevant for the scoping review. Illustrated in Figure 1, study selection utilized the flow diagram of Preferred Reporting of Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement (Liberati, Alman, Tetzlaff,

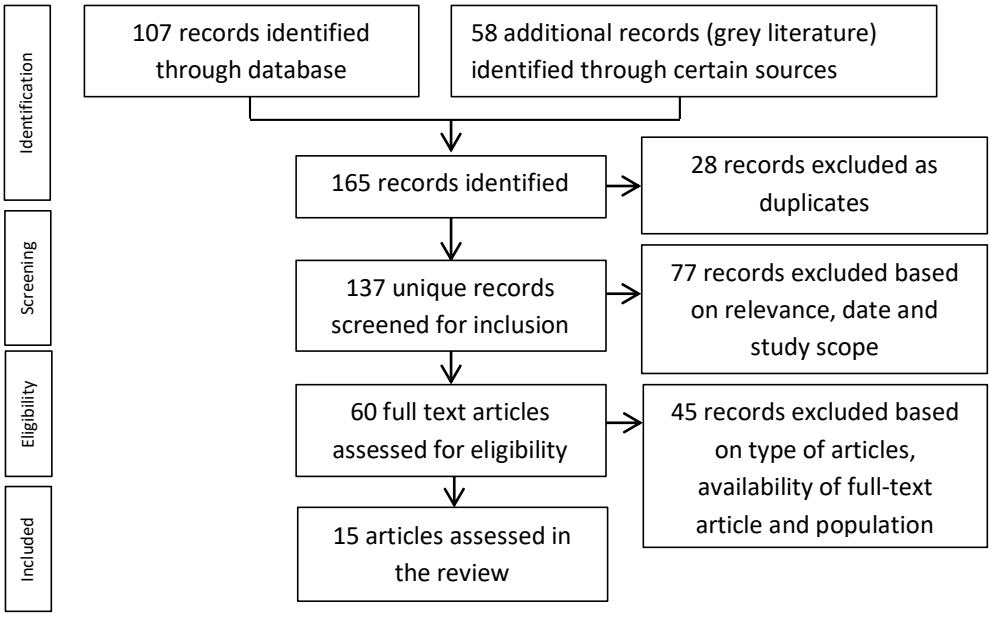

Figure 1: PRISMA flowchart of study selection

Table 3. Included studies

(Study number) Author details, year & location	Study Design/participants sample	Outcomes
(1) Cabansag, 2014 Philippines	N=124 Mixed-method design Qualitative method in gathering and documenting of data .Quantitative, data consolidation into themes and treated statistically using frequency endorsement count and percentage. The written responses were coded using thematic content analysis as the main technique.	Some students disclosed that learning is more interesting, effective and enjoyable in K-12 because they learn all four component Science areas in one year and there are varied learning activities. Moreover, students find the topics easy at first and gradually become hard but there is mastery of the topics because they are discussed in their own pace and longer years to study. On the contrary, others notion the topics are too difficult. The impact statements suggest the need for close monitoring of the program implementation coupled with continuous professional trainings of teachers to clear areas of misinterpretations.
(2) Cadavid, 2003 Colombia	Primary school teachers and six student teachers. Qualitative, information collected through journals written by respondents and interviews. Grounded approach, to analyze information that establishes categories, draw conclusions and suggest changes.	Children started developing skills to understand and use the foreign language using the spiral thematic curriculum. The children reinforced some topics in their content areas, increased their motivation towards language learning and started implementing strategies to cope with new language. One of the problems found in the implementation was the lack of resources in the school. In response to that, teachers have to be very resourceful. Connections with other institutions that can provide materials can be helpful.

continuation of Table 3

(Study number) Author details, year & location	Study Design/participants sample	Outcomes
(3) Davis, 2007 USA	Quantitative and qualitative data collection in the complete study (mixed-method design) Participants were sixth graders (no number indicated)	The experimental spiral physics curriculum increased physics achievement; however, there was no statistically significant difference in effectiveness of teaching experimental spiral physics curriculum in the aggregated sixth grade group compared to the traditional linear physics curriculum. Majority of the subgroups studied have shown statistically significant differences in effectiveness for the experimental spiral physics curriculum compared to the traditional linear physics curriculum.
(4) Davis, 2015 USA	Quantitative, physics evaluation test that measured the student's physics achievement. Collected the pre and post test scores on the PET.	In the experimental spiral physics curriculum, increased physics achievement was observed; however, there was no difference in effectiveness of teaching experimental spiral physics curriculum in the sixth grade minorities compared to the traditional linear physics curriculum in the aggregated data set. It is important to note that the majority of the subgroups studied did show statistically significant differences in effectiveness for the experimental spiral physics curriculum compared to the traditional linear physics curriculum.
(5) Elmas, Ozturk, Irmak and Cobern, 2014 Turkey	N=18 Qualitative, conducting semi-structured interview with 18 elementary science teachers and additional observational data to be recorded.	Almost every teacher admires the unit organization and is aware of the spiral structure of the new curriculum. Although they are in favor of the spiral curriculum, some of the teachers criticized the order of the concepts in the topics. Moreover, some basic concepts were omitted from the topics for the sake of the spiral curriculum. Also, teachers generally do not feel themselves sufficient in terms of content knowledge.
(6) Ferrer, 2018 Philippines	No population sample. Qualitative type of research through document analysis	It is suggested to the mathematics educators to consider the following: (1) examine carefully how to align the progression of mathematical knowledge and skills of the learners through the spiral approach; (2) conduct a regular assessment of the learners' performance as they level-up in the basic mathematics; (3) enhance students' capacity to adopt recent technological advances in learning mathematics; (4) explore strategic approaches in teaching; and (5) increase engagement in the national and international professional development programs.
(7) Merza, Orge, Agatep and Edaño, 2018 Philippines	N=74 Qualitative, survey questionnaire and documentation was used of descriptive research design. Quantitative, the average academic performance of the students in spiral approach.	The teacher-respondents agreed that curriculum, teacher, student and school factors affected the implementation of the spiral Approach. The academic performance of the students was rated "approaching proficient" in the first and second grading period. There is significant difference on the perceived factors affecting the implementation of the spiral Approach, with higher rating provided by the respondents on the teacher factor affecting spiral approach.

continuation of Table 3

(Study number) Author details, year & location	Study Design/participants sample	Outcomes
(8) Montebon, 2014 Philippines	Grade 8 students in public schools. Qualitative, survey method by the use of questionnaire that is based from the overall goals of the learning domains as stated in the k-12 curriculum standards.	Respondents gave the highest neutral perception on the increasing level complexity of how science competencies are arranged in the K-12 Science program.
(9) Orale, 2018 Philippines	N=66 Qualitative, literature review, interviews and assessment in qualitative form of student performance in mathematics.	About 71% of students who are about to move to Grade 11 are still beginners of Grade 10 mathematics. Students who proceeded to higher year levels without the needed remedial classes is very disadvantageous to the spiral progression approach. Making remedial classes for slow learners are more attractive for teachers and students alike may help in attaining the needed mastery of topics crucial for the next level.
(10) Orbe, Espinosa and Datukan, 2018 Philippines	N=12 Qualitative, interview is conducted as the data collection approach.	The spiral curriculum of the content is learner-centered, advanced and sophisticated; it is not concentrated and extensive. Chemistry instruction in the K-12 is dynamic, realistic and productive but it requires competent and highly qualified teachers and sufficient facilities.
(11) Resureccion and Adanza, 2015 Philippines	N=30 Mixed method (quantitative-qualitative design), data were processed, interpreted and analyze using statistical tools: frequency, percentage, means, "Goodness of Fit" test, and Chi-square.	Teachers observe that sometimes and often, spiral progression is effective in teaching science courses. Both private and public school teachers perceive that sometimes spiral progression in science has advantages and disadvantages. However, the study also suggests that when private and public schools are compared as to how they perceive spiral progression, private school teachers are more inclined to perceive that spiral progression is more advantageous. Discovery/inquiry learning, collaborative learning and experiential learning are the most commonly used and most effective teaching strategies of private and public school teachers under the context of spiral progression program.
(12) Samala, 2018 Philippines	N= 133 (students), all science teachers in PUPLHS Qualitative research case study	Vertical articulation of spiral progression provides deep understanding of science concepts. Discovery approach and cooperative learning are the effective teaching strategies used. Multimedia and laboratory activities play vital. Teachers suggestions were: allow practice time management, attend seminars and training and another one hour should be added per week for science classes. Students suggested for more time for review, one laboratory activity in each lesson, more detailed discussion especially on difficult areas, continued use of multimedia and other teaching aids and interactive activities. For future researchers to look at the possibility of measuring students' mastery of the subject matter through summative test or standardized test in each grade level.

continuation of Table 3

(Study number) Author details, year & location	Study Design/participants sample	Outcomes
(13) Scheuch, Amon, Sceibstock and Bauer, 2017 Austria	No number of respondents stated. Qualitative, three sketched studies that follow the principles of qualitative research.	The concept of population as the key unit of evolutionary processes is difficult to grasp for students. Students show difficulties in thinking variation within populations and therefore could not abduct the selection as the evolutionary force. Analysis of the whole sequence also showed that the population concept was not that strong anchored in the planning documents of the sequence and the enacted lessons as well.
(14) Scielleri, 2011 USA	N=34 Mixed method, qualitative and quantitative combination of data sources via triangulation to ensure an in-depth understanding of elementary mathematics	Interviewees and teachers explicitly stated their concern that the previous K-2 and current grades 3-5 mathematics curricula spent time on a large quantity of mathematics concepts, instead of focusing on depth of understanding for each concept. Recommendations include a sustained development program in both mathematical content and mathematical teaching be developed for teachers.
(15) Wong, Lam, Sun and Chan, 2008 Hong Kong	Qualitative, well-established questionnaire together with mathematics test were used in both pre-test and post-test in getting the data. Quantitative, using t-test to get the clear picture of the effectiveness of the experimentation.	Students using spiral bianshi teaching materials performed significantly better than their counterparts using standard textbook materials. However, no significant differences were identified among affective learning outcome variables despite the positive results on cognitive learning outcomes. It indicates that spiral bianshi curriculum has high potential in enhancing students' learning effectiveness. To make the spiral bianshi curriculum more effective, teachers need to have a deep understanding of the subject knowledge as well as the learning characteristics of the students.

Murlow,et al., 2009). Two reviewers (JCSPJr, RCCAB) independently selected articles and any disagreement was resolved through discussion among the researchers (JCSPJr, RCCAB & JAB).

3.4. Charting the Data

In this stage, significant information, i.e., author(s), aim of the study, location of study, year of publication, intervention/methods employed, study design, population sample, and outcomes, were extracted (Tables 3).

3.5. Collating, Summarizing and Reporting the Results

This stage involves the use of some analytic framework or thematic construction to provide a broad account of the existing literature (Arksey & O'Malley, 2005). It should also be noted that this stage makes a key difference between a scoping review and a systematic review as the first one does not intend to undertake a quality assessment

of the evidence presented of the included studies and thus, cannot ascertain whether the articles identified as eligible for a scoping exercise provide solid findings (Arksey & O'Malley, 2005). In this scoping review, the narrative approach of summarizing studies was employed. In this stage, the results reported should be relevant to the purpose of this study and the formulated research questions.

4. Results and Discussion

This scoping study included 15 articles from six countries, in which eight were conducted in the Philippines, three in the United States, and one each from the following countries: Colombia, Turkey, Austria, and Hong Kong. The results specifically discuss the teaching methods and strategies employed, teachers' and students' perceptions of it, empirical educational outcomes and impacts, and recommendations to improve its delivery. This section provides a broad view of the existing literature about the implementation of a spiral progression approach, i.e., teaching strategies and methods; students' and teachers' perception; educational outcomes and impacts; and determine areas for improvement.

4.1. What are the common teaching strategies and methods used in a curriculum designed using the spiral progression approach?

Studies focusing on the science subject disclose that discovery approach/inquiry learning, collaborative/cooperative learning, and experiential learning as the teaching strategies employed in the context of the spiral curriculum (Resureccion & Adanza, 2015; Samala, 2018). The identified pedagogies are apparently under the umbrella of learner-centered approach (Corpuz & Salandanan, 2015). Learner-centered approach in a curriculum organized using the spiral design would promote more effective learning that have been documented to produce significantly higher student achievement (Gelisli, 2009).

4.2. What are students' and teachers' perceptions in the implementation of a curriculum organized using the spiral progression approach?

Apparently, studies have shown that students' and teachers' perceptions are varied. Positive views and negative views are documented. This is relevant because teacher factor and students' learning ability are among the factors perceived to affect the implementation of a spiral curriculum (Merza, Orge, Agatep & Edaño, 2018). Focusing on the context of secondary science, students described learning as more interesting, effective and enjoyable and they noticed the continuity and increasing difficulty of the lessons but allowed mastery because learning is redefined into a progressive process of comprehension (Cabansag, 2014; Micu, 2017; Samala, 2018). Teachers have positive regard on the curriculum organization, viewing it as a learner-centered, advanced and sophisticated way of organizing the contents of a curriculum and describing it as "sometimes" and "often" effective in teaching the four main branches of science (Elmas, Ozturk,

Irmak & Cobern, 2014; Orbe, Espinosa & Datukan, 2018; Resureccion & Adanza, 2015).

Conversely, findings reveal that there were students who failed to realize the increasing complexity level of the competencies. As a result, students had difficulty in learning the topics and adjusting to science concepts per quarter (Cabansag, 2014; Montebon, 2014; Samala, 2018). They also noticed a time-consuming review and seeming repetition of topics in all grade levels (Samala, 2018).Teachers also have many criticisms towards the spiral curriculum, such as repetition of contents across grade levels, untraceable articulation of competencies, limited topic organization, lack of depth and concentration for each area in science, and the omission of some fundamental concepts, challenges in their content expertise and provision of resources (Elmas et al., 2014; Montebon, 2014; Samala, 2018; Scielleri, 2011). Public school teachers tend to view the spiral progression approach as more of a disadvantage due to perceived inadequacy of economic and human resources and facilities (Elmas et al., 2014; Resureccion & Adanza, 2015). These negative views connect to the result that curriculum and school factors are perceived to affect the implementation of a spiral curriculum (Merza et al., 2018).

4.3. What are the educational outcomes and impacts seen among students in implementing a spiral curriculum?

Literature shows that a spiral curriculum can produce positive learner outcomes, though exceptions are noted. In the context of physics, language and mathematics, positive results were documented, e.g., increased student achievement and motivation (Cadavid, 2003; Davis, 2007; Davis, 2015; Wong, Lam, Sun & Chan, 2008). Adequate and successful implementation of the curriculum realized the expected outcomes. On the other hand, such increase may not always bear significant statistical difference in aggregated data, though analysis of the subgroups of respondents yielded notable difference (Davis, 2007; Davis, 2015). Attainment of the proficient level of understanding of topics was not evident in the early quarters of the school year (Scheuch, Amon, Sceibstock & Bauer, 2017). Lack of mastery of the prior topics and the existence of a less-anchored concept in the early stages of a spiral curriculum hampered proficiency in a particular time of their schooling and have difficulty in grasping the totality of a concept in the later years (Montebon 2014; Orale, 2018; Resureccion & Adanza, 2015). Moreover, the improved implementation of a spiral curriculum emphasizes cognitive learning outcomes but limited in affective learning outcomes (Wong et al., 2008).

Apparently, the spiral progression approach can only produce mediocre effects when barriers are not sufficiently addressed in the design and implementation phase. The flaws attributed to the approach could be the reason why it failed to enhance learning or promote mastery of topics. Limitation of the approach can hinder the intended learning including the insufficient review time, reduced academic learning time, superficial learning, and inappropriate rate of introducing topics (Snider, 2004). In

addition, the poor affective learning outcomes in a spiral curriculum suggest that approach may only be exclusive to the progress in cognitive outcomes. Nevertheless, if the context is in a major curriculum change, contradicting results may surface even after the teachers have implemented the curriculum loyally (Wong et al., 2009) as there may have been underlying factors like time and resources.

4.4. What are the suggestions or recommendations to improve the implementation of a curriculum organized using the spiral progression approach?

Studies show the crucial role of the teacher in implementing the curriculum. Suggestions center on the enhancing of teacher's knowledge on curriculum and pedagogy and ensuring students' mastery of learning. Teachers must carefully study the progression of knowledge and skills, and the delivery of the curriculum should be closely monitored (Cabansag, 2014; Ferrer, 2018). To promote the effectiveness of the curriculum, teachers must be equipped with deep content and pedagogical knowledge (Samala, 2018; Wong et al., 2008). Professional trainings, seminars, and development programs are recommended to be implemented for teachers to clarify misconceptions, to be acquainted with the latest trends in education, and to widen knowledge on content and effective instructional strategies (Cabansag, 2014; Ferrer, 2018; Samala, 2018; Scielleri, 2011). To supplement educational resources, teachers are highly encouraged to develop community of practice with other institutions (Cadavid, 2003).

Mastery of learning is paramount. Additional instructional time is proposed to cover the necessary topics (Samala, 2018). In conducting lessons, adequate time for review, more in-depth discussion for difficult areas, provision of interactive and experiential activities (e.g. laboratory activity), and the use of effective instructional materials such as multimedia, models, and mind-maps are needed (Samala, 2018). In the case of struggling learners, strategic approaches like differentiated instruction should be utilized, remedial classes should be conducted and the teacher's ability to adopt technological advancements for learning must be enhanced (Ferrer; 2018; Orale 2018). The integral role of assessment, emphasized as formative assessment, should be conducted and a summative or standardized test in each grade level should be administered to measure students' mastery of the subject matter (Ferrer, 2018; Samala, 2018).

Lastly, the scoping review methodology provides important insights on spiral progression approach. The study was able to summarize current literature into key areas of the spiral progression approach in terms of the teaching strategies used, students' and teachers' perceptions, effectiveness, and recommendation for improvement. However, as the methodology does not assess the quality of the evidence presented in the included studies (Levac, Colquhoun & O'Brien, 2015), it may also be recommended that a systematic review be conducted to determine such, but with consideration to the costs, and if it will be feasible and relevant (Arksey & O'Malley, 2005).

5. Conclusion and Recommendation

Spiral progression approach is grounded on various theories, principles, and philosophies in education. It is anchored on learner-centered pedagogy. Teachers and students hold both positive and negative perceptions towards the implementation of a spiral progression curriculum. Students' concerns surround more on their interest and awareness of the sequenced competencies. Highly esteemed teachers have a better implementation of a spiral progression approach. The spiral curriculum generally can produce positive cognitive learning outcomes.

In the implementation of the spiral progression approach, recommendations encompass two key aspects, i.e., 1) enhance teacher's knowledge on curriculum and pedagogy in preservice and in-service training and 2) teachers should ensure students' mastery of learning. Gaps in the literature are noticeable, i.e., need for more studies that would look into the spiral curriculum, specifically the teaching methods used in the implementation, students' perception and empirical outcomes to provide a bigger data pool for its effectiveness. Lastly, it is also suggested that spiral curricula of subject areas other than Mathematics and Science along different educational levels should also be studied to capture a broader picture.

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