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Science Teachers' Experiences with the Spiral Progression Approach in the Philippines: A Scoping Review

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ABSTRACT

The Spiral Progression Approach (SPA) has been introduced into the science education curriculum in the Philippines for purposes of ensuring continuity, integration, and progressive learning of science concepts by students across different grade levels. However, the literature regarding the experiences of science teachers in implementing this approach is scattered across many areas. This scoping review was carried out in order to identify and consolidate all the available evidence regarding the experiences of science teachers in the implementation of the SPA in the Philippine context. This study used the scoping review methodology framework established by Arksey and O'Malley (2005), supported by JBI methodology and PRISMA-ScR reporting frameworks. Ten (10) studies met the eligibility criteria and were included in the review. The results indicated that the experiences of the teachers were both positive and challenging at the same time. SPA was seen to be advantageous in fostering continuity of learning, concept reinforcement, engagement of the learners, and wider exposure to different fields of science. However, the persistent difficulties faced included teaching outside the specialization of the teachers, lack of mastery of the content taught, inability of the learners to retain the prerequisites to the concepts, lack of time to teach, lack of sufficient learning materials, inadequate laboratory facilities, and difficulties in linking concepts from different grade levels. Responses included peer mentoring, teamwork, cooperative learning, independent learning, internet searching, activity adaptation, and localization of teaching materials. From the above discussion, it can be noted from the literature that the implementation of SPA by teachers is affected by the curriculum, teacher preparedness, student preparedness, resourcefulness, and context. Thus, further research is needed on teachers' personal experiences, their strategies for dealing with these situations, and curriculum implementation in different Philippine contexts.

INTRODUCTION

Spiral Progression Approach (SPA) for science education can be described as a significant reform in the science curriculum that has been implemented in the Philippines' basic education program under K to 12 Program. Based on the spiral curriculum concept developed by Bruner in 1960, the approach holds that fundamental concepts should be revisited across grades with increasing complexity and depth of understanding. In Philippine science education, such a concept is implemented through the integration of Biology, Chemistry, Physics, and Earth and Space Sciences across the grades instead of studying them separately (Tirol, 2022). An integrated and progressively structured science curriculum was supposed to ensure continuity and integration of scientific knowledge and skills acquisition (Orbe *et al.,* 2018). However, implementation of such curriculum imposes serious requirements on the teachers who have to teach the topics beyond their specialization field (Resureccion *et al.,* 2016). It is important to understand how teachers implement SPA in practice, what challenges they face, and what instructional approaches they use.

Previous empirical studies have shown that the implementation of SPA by teachers is multi-dimensional and influenced by a number of factors like teachers' disciplinary preparation, instruction, professional development, resources, and contexts (Orbe *et al.,* 2018; Manzano, 2022). However, in the case of the Philippines, the previous literature has mentioned issues related to content knowledge, pedagogical knowledge, resourcefulness, and administration in teaching science content outside teachers' specialization (Orbe *et al.,* 2018; Manzano, 2022). On the other hand, teachers have exhibited their adaptability to the issue of content knowledge through peer collaboration, mentoring, team teaching, and other teaching approaches (Manzano, 2022). Some other empirical studies have focused on different aspects, such as teacher competence, digital literacy, professional support, and teaching context (Calzado & Abo, 2025; Jarap & Puertos, 2026). Hence, these empirical studies have shown that a lot of research has been done on teachers' implementation of the SPA, but in fragmented manner.

Notably, SPA has previously been explored using review studies. For instance, Perez *et al.* (2020) carried out a scoping review on studies on the implementation of SPA involving teaching strategies, perceptions of the teachers and the students, learning outcomes, and

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recommendations. Tirol (2022) also offered a review on the relevance, benefits, challenges, and implementation of SPA in the science curriculum for primary and secondary education. However, the body of evidence on the topic has grown beyond these previous reviews in areas such as teachers' experience, discipline readiness, teaching methods, adaptation, use of technology, professional development, and contexts. Besides, the body of evidence on SPA differs in terms of population, setting, location, methodology used, and focus on particular implementation aspects. Therefore, an updated mapping study of the existing evidence is required to establish how the research has characterized the experience of science teachers with SPA in the Philippines, what kind of experience and implementation issues are recurring in the studies, what kind of responses and practice have been identified, and what evidence gaps still exist.

A scoping review is therefore appropriate because the purpose of this study is to map the extent, range, and nature of available evidence across diverse studies rather than to determine the effectiveness of a particular intervention or estimate a single outcome. Arksey and O'Malley (2005) describe scoping studies as a method for mapping relevant literature, particularly when a field encompasses broad topics and different types of evidence. In adopting the framework, the following can be achieved: (1) examine the extent and nature of existing research on the implementation of the Spiral Progression Approach; (2) determine the need for further systematic review of the available evidence on the curricular approach; (3) summarize and disseminate existing research findings related to the Spiral Progression Approach; and (4) identify potential gaps in the existing literature that may warrant further investigation. The framework also recognizes the identification of gaps in the existing evidence base as an important purpose of a scoping study.

Following this theoretical model, this current review concentrates particularly on the experience of science teachers in relation to the Spiral Progression Approach in the Philippines. It aims to determine what the experiences that have been articulated in the literature are; what the opportunities and obstacles were in implementing the approach; what the teaching approaches used by the teachers were; and what conclusions and recommendations emerged from existing literature. This review is also intended to identify gaps in the literature that may become guides for future research and training programs.

Objectives

This study mapped and analyzed the existing evidence on science teachers' experiences with the Spiral Progression Approach in the Philippines through a scoping review. Specifically, it aimed to identify and describe science teachers' experiences with the Spiral Progression Approach as reported in Philippine literature. This study also aimed identify and map the opportunities and challenges experienced by science teachers in implementing the approach and identify and describe the teaching strategies, practices, adaptations, and responses used by science teachers to address implementation challenges. In addition it also intended to identify and synthesize the insights and recommendations reported in the literature regarding the implementation of the Spiral Progression Approach in science education and identify gaps in the existing literature on science teachers' experiences with the Spiral Progression Approach in the Philippines.

MATERIALS AND METHODS

This scoping review follows guidelines laid down by the Joanna Briggs Institute for conducting scoping reviews (Peters *et al.,* 2020). This is based on the pioneering work of Arksey and O'Malley (2005) on the scoping review methodology and its subsequent advancements. The approach adopted by the Joanna Briggs Institute has been used to ensure that the review is conducted in a systematic manner. Reporting of the review was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) developed by Tricco *et al.* (2018).

Scoping Review design was deemed suitable for this review since the objective of the review was not to assess the effectiveness of any intervention nor to make an estimation of any pooled effect. Rather, the aim was to map the body of evidence concerning the experiences of science teachers with the use of Spiral Progression Approach (SPA) in the Philippines. Major steps undertaken in the review process included: Eligibility Criteria; Sources of Evidence; Study Selection; Charting of Data; and Synthesis of Results.

Eligibility Criteria

These eligibility criteria were defined using the Population-Concept-Context paradigm, and they were applied consistently in the process of screening titles and abstracts as well as assessing full texts. These criteria considered factors including the publication date range, language, type of publication, study design, population, concept, context, the relevance of the evidence, accessibility to full text, and duplicate studies. Table 1 displays the criteria and their rationales.

Population. The population comprised junior high school and senior high school science teachers with experience implementing SPA. Mixed-population studies were included only when findings concerning secondary science teachers could be separately extracted.

Concept. The concept focused on teachers' experiences in implementing SPA, including their opportunities, challenges, instructional practices, adaptations, responses, insights, and recommendations.

Context. The review covered studies conducted in Philippine public or private secondary schools within the K to 12 basic education system.

Table 1: Inclusion and Exclusion Criteria

Criterion	Inclusion	Exclusion	Justification
Publication period	Published from 2013 to the final search date in 2026.	Published before 2013 or after the final search date.	SPA was implemented under the Philippine K–12 curriculum beginning in 2013.
Language	Published in English.	Published in other languages.	English could be reliably assessed by the reviewers; translation resources were unavailable.
Publication type	Peer-reviewed empirical journal articles.	Conference papers, preprints, theses, dissertations, books, reports, reviews, and other non-journal publications.	This ensured a consistent scholarly and empirical evidence base.
Study design	Qualitative, quantitative, or mixed-methods studies.	Non-empirical, theoretical, conceptual, or review studies.	Original empirical findings were required to answer the review questions.
Population	Junior high school or senior high school science teachers.	Elementary teachers, students, pre-service teachers, administrators, or tertiary educators.	The review focused specifically on secondary science teachers' experiences.
Mixed populations	Secondary-teacher findings were separately extractable.	Secondary-teacher findings could not be separated.	This ensured that only evidence relevant to the target population was synthesized.
Concept	Experiences, challenges, practices, responses, insights, or recommendations related to SPA.	SPA was only mentioned without relevant teacher findings.	Included studies needed to address the review's central concept.
Context	Philippine public or private secondary schools.	Studies conducted outside the Philippines or outside secondary education.	The review examined SPA within Philippine secondary education.
Full-text availability	Complete article was accessible.	Complete article was unavailable.	Full texts were necessary for eligibility assessment and data charting.
Repository records	Verified as a peer-reviewed journal article.	Repository-only manuscript or preprint.	Repository records were used only to locate formally published articles.
Duplicate records	Most complete journal version was retained.	Duplicate or overlapping records.	This prevented the same evidence from being counted more than once.

Information Sources

A comprehensive literature search was conducted across five information sources: ERIC, the Directory of Open Access Journals (DOAJ), Philippine E-Journals, Google Scholar, and SSRN. ERIC, DOAJ, and Philippine E-Journals were searched to identify relevant scholarly journal articles. Google Scholar was used as a supplementary discovery source because of its broad coverage of academic literature, while SSRN was searched to locate difficult-to-find manuscripts and possible repository copies of published studies.

Scopus was not included because institutional access was unavailable during the review period. To compensate for this limitation, multiple education, open-access, Philippine-based, and supplementary information sources were searched to broaden the coverage of the available literature. Nevertheless, the absence of Scopus was recognized as a limitation because studies indexed exclusively in this database may not have been retrieved.

Although Google Scholar and SSRN may retrieve gray literature and other non-journal materials, only studies verified as peer-reviewed empirical journal articles were eligible for inclusion. Records identified through SSRN were retained only when they could be linked to articles formally published in peer-reviewed journals. Thus, searching SSRN broadened the identification of potentially relevant literature without altering the review's publication-type criterion.

The electronic search was supplemented by examining the reference lists of relevant reviews and eligible studies to identify potentially relevant articles that might not have been retrieved through the initial searches. Journal and publisher websites were also consulted to verify publication details, peer-review status, DOIs, participant characteristics, and overall eligibility. No formal hand-searching of complete journal issues was undertaken. The most recent search across all information sources was executed on August 11, 2026.

Search Strategy

The search strategy used terms related to population, curricular approach, and geographical context, combined through Boolean operators. No field-specific restrictions were applied. Each search strategy was entered into the default search interface of ERIC, DOAJ, Philippine E-Journals, SSRN, and Google Scholar, allowing the terms to be searched across all fields indexed or made searchable by each platform. Google Scholar results were arranged by relevance. The searches retrieved 60 records: three from ERIC, one from DOAJ, six from SSRN, four from Philippine E-Journals, and 46 from Google Scholar. Where available, results were limited to publications from 2013 to August 11, 2026, the final search date. Reference lists and journal and publisher websites were also examined to identify additional studies and verify publication details and eligibility, but no additional unique records were found. No forward-citation searching or formal hand-searching of journal issues was conducted. Table 2 presents the complete database-specific search strategies.

Table 2: Search Strategy

Information source	Complete search strategy	Date last searched	Records retrieved
ERIC	("science teacher*" OR "science educator*" OR "secondary science teacher*" OR "secondary school science teacher*" OR "junior high school science teacher*" OR "science teaching") AND ("spiral progression" OR "spiral progression approach" OR "spiral progression model" OR "spiral curriculum" OR "spiral curriculum approach") AND (Philippines OR Philippine)	August 11, 2026	3
DOAJ	(“science teacher” OR “science teachers” OR “science educator” OR “secondary science teacher” OR “science teaching”) AND (“spiral progression” OR “spiral progression approach” OR “spiral curriculum”) AND (Philippines OR Philippine)	August 11, 2026	1
SSRN	"spiral progression" "science teacher" Philippines	August 11, 2026	6
Philippine E-Journal	“spiral progression” AND “science teacher”; “spiral progression approach” AND science; “spiral curriculum” AND “science teacher”; “spiral progression” AND “secondary science”; “spiral progression” AND “junior high school”; “spiral progression” AND “senior high school”; and “spiral progression” AND “science teaching.”	August 11, 2026	4
Google Scholar	"spiral progression" "science teachers" OR "specialized teachers" challenges OR experiences Philippines	August 11, 2026	46

Selection of Sources

Following the database and supplementary searches, all retrieved records were compiled and checked for duplicates. One reviewer conducted the title-and-abstract screening and full-text assessment using the predefined eligibility criteria. Records with unclear eligibility were referred to the second reviewer for checking. Any differences in judgment were resolved through discussion and consensus between the two reviewers. No third reviewer was required.

No formal pilot screening was conducted; therefore, zero records were pilot-screened and no pilot-screening agreement was calculated.

The searches identified 60 records, of which 15 duplicates were removed. The remaining 45 records underwent title-and-abstract screening, and 22 were excluded because they did not meet the publication-period, population, context, or study-focus criteria. The full texts of the remaining 23 records were assessed for eligibility. Thirteen full-text articles were eliminated since they failed to meet some of the inclusion criteria regarding publication type, study population, relevancy to SPA, empirically based evidence, or availability of full text. These include two conference papers that had been deemed eligible in the first place but were eventually eliminated after confirmation of the publication types. Therefore, only 10 articles met all the inclusion criteria and were selected for the review.

Figure 1 on the next page

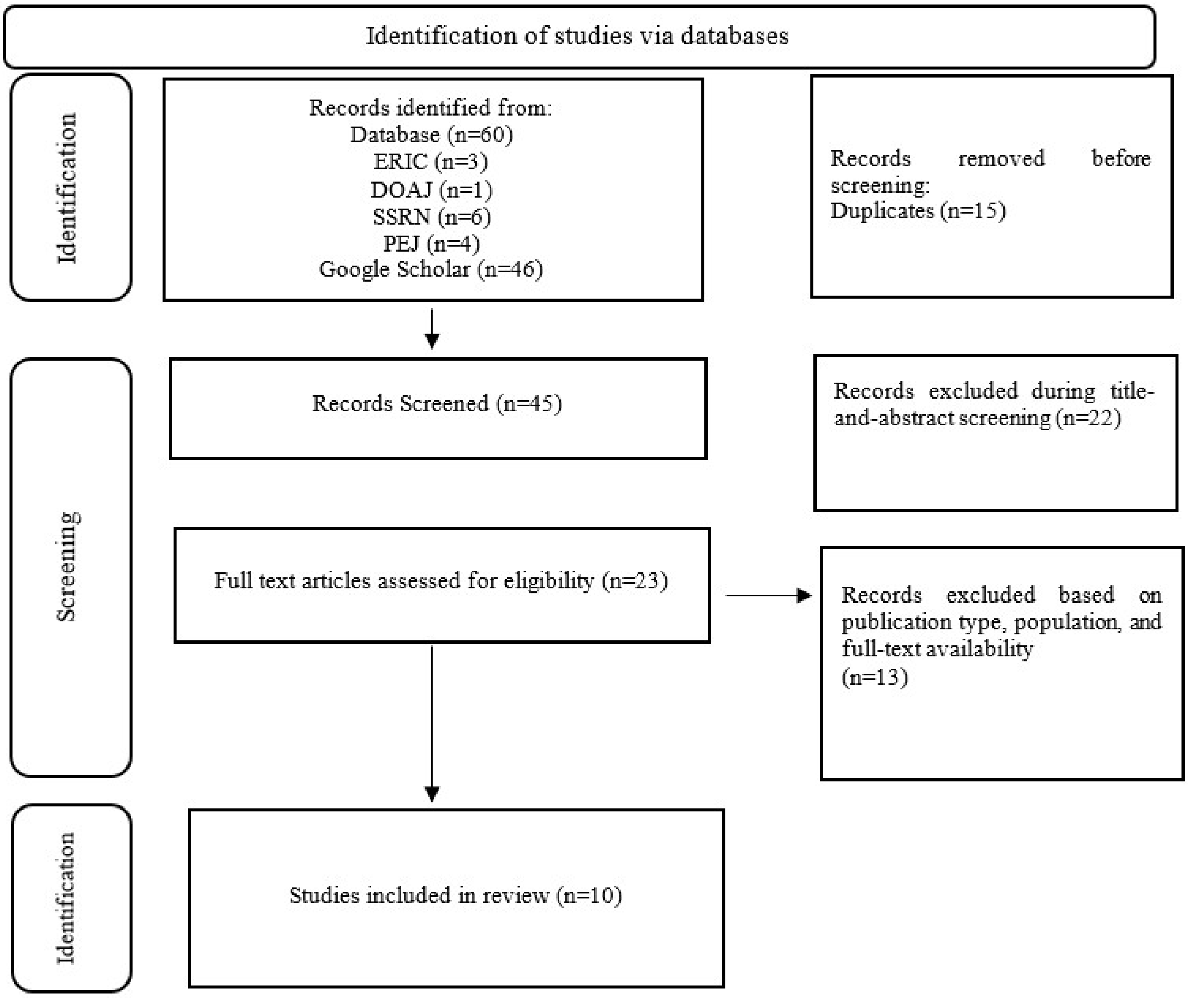

Figure 1: PRISMA flowchart of study selection

Data Charting Process

Relevant information from the included studies was systematically extracted and organized using a standardized data-charting table to facilitate comparison and synthesis. The variables charted included the author(s), year of publication, study location, study aim, research design, methods employed, study population or sample, and key findings or outcomes. One reviewer performed the initial data extraction and charting, while a second reviewer examined the completed table for completeness, accuracy, and consistency with the original articles. Differences concerning the extraction, interpretation, or presentation of information were resolved through discussion and consensus. Because the data were not independently charted by two reviewers, no formal inter-rater agreement statistic was calculated. The final charted information is presented in Table 3.

Table 3: Included Studies

(Study number) Author details, year & location	Study Design/participants sample	Key Findings
(1) Gonzales, (2019) Bahay Pare National High School, Candaba, Pampanga, Philippines	Qualitative narrative case study; five seasoned Junior High School science teachers with at least 10 years of teaching experience, selected through purposive sampling.	Teachers reported difficulties and dissatisfaction with the Spiral Progression Approach, particularly concerning limited resources, insufficient knowledge outside their specialization, and ICT integration. Nevertheless, some teachers, especially those who majored in general science, could see the value of the method. Administrative support, especially through mentoring, coaching, and training, was seen as essential to successful application of the method.

(2) Orbe *et al.,* (2018) Cavite, Philippines	Qualitative study using semi-structured interviews; 12 science teachers teaching Chemistry under the K–12 curriculum in four high schools in a district of Cavite. Most participants were female (83.33%), had 10–20 years of teaching experience, and only 25% had a formal Chemistry background.	The teachers viewed the Spiral Progression Approach as learner-centred, but felt that the content was not adequately focused and was not extensive enough to enable effective teaching. Difficulties encountered include inadequate training, lack of resources, and inadequate laboratories. Teaching of chemistry was said to be active and based on inquiry, but this depended on the competence of the teacher. Overall, challenges related to content mastery, pedagogy, resources, and assessment affected Chemistry instruction within the K–12 curriculum.
(3) Rosas, (2019) San Isidro, Leyte, Philippines	Qualitative descriptive phenomenological study using Giorgi's approach; Five (5) junior high school science teachers purposively selected through snowball sampling. Participants specialized in Biological Science, Chemistry, General Science, and Physical Science and had experience transitioning from teaching within their specialization under the old curriculum to teaching general science under the K–12 Spiral Progression Approach.	Teachers viewed SPA as a continuous progression of concepts, with foundational knowledge introduced at earlier grade levels and developed with increasing complexity. However, specialized teachers experienced difficulties teaching science disciplines outside their areas of specialization, particularly when dealing with unfamiliar concepts, formulas, and computations. Teachers also reported students' limited retention of prerequisite concepts and insufficient learning resources as challenges. To cope, teachers used game-based instruction, peer tutoring, self-directed reading and internet research, and collaboration with subject-matter colleagues through mentoring and coaching. Despite initial difficulties, teachers developed greater flexibility and expanded their science knowledge beyond their specialization. Nevertheless, all participants preferred the old curriculum, citing deeper specialization, greater student mastery, and greater teacher familiarity compared with the demands of the spiral curriculum.
(4) Nahine *et al.* (2024) Division of Bukidnon, Philippines	Qualitative study using thematic analysis; four science teachers from Don Carlos National High School, with one teacher representing each grade level from Grades 7–10. Participants were purposively selected. Data were gathered through adapted and modified interview questions focusing on chemistry content articulation, teachers' experiences, and suggestions.	Teachers found the articulation of the Chemistry curriculum from Grade 7 through to Grade 10 as structured and increasing in complexity. This allowed learners to retain, understand and be continuously exposed to these concepts. However, teachers experienced difficulty when it came to issues related to lack of knowledge in the subject matter, lack of time and too much revising of concepts. Teachers outside the Chemistry specialization experienced difficulty simplifying and elaborating chemistry concepts. They recommended assigning teaching loads according to teachers' specialization, providing simplified and detailed learning materials with practical activities, and revisiting curriculum planning to account for differences in learners' capabilities and contexts.
(5) Mariano & Mina-Roguel (2025) Cabanatuan City, Nueva Ecija, Philippines	Quantitative descriptive-correlational study involving 28 private JHS science teachers from 14 private schools during SY 2023–2024. Complete enumeration was used. Data were collected using a 57-item questionnaire measuring perceived science teaching effectiveness in SPA and science teaching efficacy beliefs.	Teachers reported high science teaching efficacy and generally positive perceptions of their effectiveness in implementing SPA. They strongly agreed that SPA promotes lesson continuity, application of prior knowledge, progressive content complexity, and interdisciplinary integration. Teachers also valued professional development, peer observation, mentorship, webinars, and conferences. Despite these positive perceptions, teachers reported challenges involving students' difficulty recalling concepts from previous grade levels and the need to review prior lessons. A significant positive relationship was found between perceived teaching effectiveness in SPA and science teaching efficacy beliefs (ϱ = .578, p = .001). Training and professional development showed the strongest association with teaching efficacy (ϱ = .661, p < .001).

(6) Baron & Dela Cruz (2023) Buayan District, General Santos City, Philippines	Quantitative descriptive study using total enumeration; 60 secondary science teachers from three public secondary schools during SY 2021–2022. Data were collected using a validated researcher-made questionnaire assessing the VUCA dimensions of SPA and its level of implementation.	Teachers generally reported a low level of volatility, uncertainty, complexity, and ambiguity (VUCA) associated with SPA, while implementation was rated "often." However, specific concerns included lack of differentiated instruction, unequipped teaching environments, insufficient educational technology integration, limited multidisciplinary approaches, inadequate opportunities for applying skills, and lack of teacher expertise across the four science disciplines resulting in out-of-field teaching. Teachers reported frequent implementation of SPA in terms of learning objectives and competencies. Recommendations emphasized cross-disciplinary teacher training, ICT capacity building, provision of science resources and equipment, and broader research on SPA implementation.
(7) Hernandez (2021) Batangas City, Philippines	Descriptive quantitative study using an action research approach; eight Junior and Senior High School science teachers from Paharang Integrated School. Data were gathered through interviews and a validated researcher-made 4-point Likert questionnaire.	Teachers reported challenges related to inadequate learning materials, difficulty conducting activities, students' weak retention of prerequisite concepts, the need for re-teaching, and difficulty connecting topics across grade levels. To address these challenges, teachers reported modifying activities, conducting online research, using cooperative learning, sharing teaching techniques with colleagues, and localizing instructional materials. Teachers also strongly supported resourcefulness, student choice, active learning, classroom discussion, and frequent feedback as ways to strengthen SPA implementation. The study recommended continued mentorship, professional support, and professional development to address teachers' instructional needs.
(8) Linaugo (2026) Central Philippines	Qualitative multiple case study using Braun and Clarke's thematic analysis. Five science teachers (two elementary and three secondary) were selected through purposive sampling. Data were gathered through semi-structured interviews, focus group discussions, and document analysis of curriculum materials, lesson plans, and teacher reflections.	Teachers experienced curriculum fatigue and increased workload amid repeated curriculum changes. The Spiral Progression Approach was associated with difficulties in student concept retention and the need for re-teaching. Other challenges highlighted by the teachers include poor science facilities, instructional and ICT materials, lack of strong student foundations and socio-economic constraints that hinder the process. The strategies used by the teachers to mitigate the challenges include peer teaching, group learning, simplified lessons, contextualization and self-development. Another strategy that the teachers applied was use of personal money to cater for lack of resources. Recommendations emphasized stronger institutional support, adequate resources and infrastructure, targeted curriculum training, foundational literacy and numeracy support, and greater stability in curriculum reforms.
(9) Degorio (2022) Baybay City, Leyte, Philippines	Descriptive-evaluative study framed around John Dewey's Theory of Experience. Purposive sampling was used to select 19 secondary science teachers from five secondary schools. Participants were BSEd Science graduates teaching science subjects. Data were gathered using an expert-validated four-part questionnaire covering teacher profiles, teaching experiences, teaching difficulties, and qualitative comments, analyzed through frequency counts and thematic analysis.	Teachers perceived the old discipline-based and K–12 spiral curricula as meeting basic content standards, but the spiral curriculum was not perceived to provide clear unique advantages in content arrangement and progression. Major difficulties included misalignment and discontinuity of topics, broad content coverage, quarterly shifts across science disciplines, limited instructional time, re-teaching of prerequisite concepts, and rushed discussions. Teachers noted that equal time allotments for topics of varying difficulty could compromise content mastery. Nevertheless, the learner-centered and outcome-based nature of SPA was viewed positively for promoting student participation and engagement. Recommendations included re-sequencing content, adjusting content scope and instructional time, adding foundational topics, and involving practicing teachers in curriculum revisions.

(10) Manzano (2022) Eastern Samar, Philippines	Qualitative phenomenological study using phenomenological reduction and cool/warm data analysis. Five Junior High School science teachers with different specializations were purposively selected. Data were collected through unstructured open-ended interviews, which were audio-recorded, transcribed verbatim, and analyzed thematically.	Personal competence, limitations in comprehension of concepts and resource support were identified by the teachers as factors that characterized their experience of SPA. Teachers had confidence in what they could do in their areas of specialization but saw teaching other sciences as a chance to learn more things and acquire new skills in teaching. Nevertheless, teachers struggled to explain some complicated concepts in other areas of science except their area of specialization especially in physics and chemistry. To overcome these limitations, they used peer tutoring and mentoring, team teaching, self-learning using online sources and the improvisation of local materials due to inadequacy of laboratory materials.

[1] Linaugo (2026) included two elementary and three secondary science teachers. The study was retained because findings concerning the secondary participants were separately identifiable. Only evidence attributable to the secondary science teachers was extracted and synthesized

Synthesis of Results

The findings were synthesized narratively according to the objectives of the review. One reviewer repeatedly examined the extracted findings, compared results across the included studies, and organized recurring findings under broad descriptive categories concerning teachers' experiences, opportunities and challenges, instructional practices and responses, insights and recommendations, and research gaps. These categories were guided by the review objectives rather than developed through formal thematic coding or qualitative thematic analysis. Therefore, no codebook was prepared, no coding pilot was conducted, and no inter-coder agreement statistic was calculated. The synthesis was intended to describe patterns and differences across the available literature rather than generate interpretive themes. A second reviewer examined the resulting categories and narrative synthesis for consistency with the charted evidence. Differences in interpretation or categorization were resolved through discussion and consensus, and no third reviewer was required.

Registration Protocol and Quality Appraisal

No review protocol was prospectively registered or published. The review procedures were developed using the Joanna Briggs Institute guidance and reported according to PRISMA-ScR. The absence of a registered protocol was acknowledged as a methodological limitation because the original planned methods and any subsequent changes could not be independently assessed. No formal methodological quality or risk-of-bias appraisal was conducted because the review aimed to map and describe the available evidence rather than evaluate intervention effectiveness or determine the certainty of evidence. In accordance with JBI guidance for scoping reviews, critical appraisal was considered optional and was not required to address the review objectives. Therefore, studies were included based on the predefined eligibility criteria rather than methodological quality. Consequently, the synthesized findings should be interpreted as a description of the available literature and not as an assessment of the strength or certainty of evidence.

RESULTS AND DISCUSSION

The review included 10 studies examining secondary science teachers' experiences with the Spiral Progression Approach (SPA) in the Philippines. The studies represented different school settings, geographical locations, participant groups, and research designs. Collectively, they examined teachers' experiences, opportunities and challenges, instructional practices, adaptations, professional support, insights, and recommendations concerning SPA implementation.

Across the evidence, recurring concerns included teaching science disciplines outside teachers' areas of specialization, learners' limited retention of prerequisite concepts, insufficient instructional time, inadequate learning resources, and limited laboratory and technological facilities. Teachers responses to the Spiral Progression Approach included cooperation, mentoring, self-learning, modification of activities, localization of instructional materials, cooperative learning, and technology integration. In addition to describing their experiences, the synthesis reveals that the use of the Spiral Progression Approach is influenced by the relationship between curriculum development, teacher training, readiness of the learners, institutional support, and resources. Therefore, this section highlights the existing literature on science teachers' experiences on using the Spiral Progression Approach in the Philippines.

1. What experiences of science teachers with the Spiral Progression Approach have been reported in the Philippine context?

Secondary school science teachers encountered difficult and professionally development experiences. A commonly shared experience was teaching science subjects that were not within teachers' specializations. The challenges included difficulties in explaining concepts, solving mathematically related problems, and dealing with Physics and Chemistry subjects due to teachers' limited knowledge and confidence (Manzano, 2022;

Rosas, 2019). Similarly, according to Nahine *et al.* (2024), teachers specializing outside Chemistry faced challenges in simplifying and elaborating Chemistry concepts.

The continuity of the problem in out-of-field teaching in various geographical settings and studies points to an inherent conflict between the structure of SPA as an interdisciplinary program and the specialization of the science teaching workforce in the Philippines. The former involves teaching all four sciences – Biology, Chemistry, Physics, and Earth and Space Science, while the latter involved training in just one particular science discipline. The problems of implementation therefore cannot simply be blamed on the personal capabilities and willingness of teachers alone.

In addition to that, teachers often found themselves working with students who were unable to remember prerequisite concepts taught at previous grade levels. Teachers had to go back and revisit previous concepts before moving onto more advanced concepts (Hernandez, 2021; Degorio, 2022; Nahine *et al.,* 2024). The repeated occurrence of prerequisite knowledge gap indicates that although the vertical articulation of SPA is intended, it does not guarantee that the learning is cumulative. Repeated exposure will only help the learner master a concept if the learner remembers prerequisite concepts and the teacher connects previous learning with current learning.

These were not the only areas where the teachers found chances to learn. Having to teach several different sciences pushed them to enhance their content knowledge, ask for help from fellow teachers, and try out other teaching methods (Manzano, 2022; Rosas, 2019). Mariano and Mina-Roguel (2025) also noted that mentoring, observation by colleagues, webinars, and professional development helped implement SPA.

These results demonstrate that professional development for teachers through SPA was, in many cases, driven by challenges of the curriculum and not due to an existing support framework. Teachers' resilience and resourcefulness were crucial in helping them deal with new material, although dependence on personal effort may lead to inconsistent implementation of SPA in different schools. Teachers who have more collegial relationships, training opportunities, or sufficient resources may find themselves in a better position to deal with SPA compared to teachers lacking these advantages.

2. What opportunities and challenges have science teachers reported in implementing the Spiral Progression Approach?

The reviewed research studies noted that the opportunity for continuity and progressive learning was the main advantage of SPA. The repeated learning of science topics from one grade level to another was viewed by teachers as an opportunity to improve learning since it would build on previous learning (Nahine *et al.,* 2024; Mariano & Mina-Roguel, 2025). The other advantage of SPA was exposure to diverse fields of science, allowing teachers to expand their knowledge in fields other than those that were initially their specialization (Manzano, 2022; Rosas, 2019).

Such advantages imply that the value of SPA is not just in going over old information but in building deeper conceptual connections each year. At the same time, based on the study results, there appears to be an indication that the possibilities for building on knowledge depend on the quality of articulation of the curriculum and its implementation in the classroom. If there are clear connections between grade levels, then SPA can help maintain the continuity of learning. Otherwise, much more time will need to be spent on reviewing the material.

Issues concerning teacher readiness have been mentioned constantly. Teachers found it hard to deliver non-specialized subjects, especially those that include complicated scientific ideas, formulas, and mathematics (Rosas, 2019; Manzano, 2022; Nahine *et al.,* 2024). Lack of proper training and subject knowledge also had an influence on teachers' ability to deliver the interdisciplinary curriculum (Orbe *et al.,* 2018).

This trend further strengthens the perspective that the issue of readiness of teachers under SPA must be considered as a system-wide matter. The curriculum calls for disciplinary breadth, while teacher preparation and placement systems focus on specializations. Professional development can bridge the gap, but temporary professional development may not suffice in terms of acquiring the required knowledge in teaching several science subjects.

Curriculum pacing and instructional time were also continuous problems for teachers. Teachers had to revisit the concepts that were forgotten before teaching competencies which take much time to be completed (Hernandez, 2021; Degorio, 2022; Nahine *et al.,* 2024). In this case, there is a dilemma between the content being taught and the concept being understood. If teachers were forced to finish the content prescribed by the curriculum, this would push them to go on with the lessons despite poor understanding, while revising for more time would make them skip other competencies.

Inadequacy of materials, lab equipment, well-equipped classrooms, and ICT facilities was another factor that further restricted teachers' capacity to deliver practical science lessons (Orbe *et al.,* 2018; Hernandez, 2021; Rosas, 2019; Baron & Dela Cruz, 2023). This issue is very important because the complexity of science learning needs the use of demonstration, experiment, model, and other tangible means. The lack of such material resources impedes the process of moving from knowledge to its practical application.

Hence, SPA provides possibilities for cumulative learning, inter-disciplinary experience, and teacher development. Nonetheless, these possibilities will always be contingent upon how well aligned curriculum sequencing, teachers' knowledge, learners' readiness, teaching time, and institutional capabilities will be. It is thus evident that SPA can only be successfully implemented in conjunction with all the various aspects of the educational system.

3. What teaching strategies, practices, adaptations, and responses have science teachers reported in implementing the Spiral Progression Approach?

Both the teacher and the learners utilized learner-centered and cooperative teaching methods to deal with the learners' differences in terms of their previous knowledge and readiness. According to Hernandez (2021), the methods included cooperative learning, class discussions, active learning, continuous feedback, and adaptation of activities. On the other hand, Rosas (2019) found out that the game-based teaching method and peer tutoring were used.

In cases where prescribed instructional materials were absent or inadequate, teachers would also alter, localize, and enhance them accordingly. This included conducting online searches for instructional materials, using locally sourced materials, improvising laboratory materials, and varying activities according to the needs of the learner and the school (Hernandez, 2021; Manzano, 2022; Rosas, 2019). Common strategies in case of forgetting prerequisites include review and reteaching (Hernandez, 2021; Nahine *et al.,* 2024; Linaugo, 2026).

This practice is a good example of the capability of the teacher to use his or her professional discretion and modify the curriculum as required by the real classroom context. Nevertheless, the constant necessity for teachers to improvise materials and review previous information also suggests that the teacher's modification is sometimes made due to the lack of quality materials, poor articulation of the curriculum, or unpreparedness of learners. It is possible to continue the lesson thanks to resourcefulness, but it does not mean that the problem is solved.

Professional collaboration was yet another significant response. Teachers would collaborate with professionals who had expertise in certain areas of sciences. They exchanged their teaching practices, mentored each other and conducted team teaching. Manzano (2022) and Rosas (2019) have noted this point too. Mariano & Mina-Roguel (2025) have also mentioned the importance of mentoring, peer observations and webinars.

Due to the emphasis on collaboration, it appears that the implementation of SPA is best achieved through a group endeavor rather than an individual one on the part of the teachers. Since there can be no specialized teacher who has knowledge equivalent to that required in each of the sciences, the establishment of communities of practice within the schools and collaboration in lesson preparation could be of help.

In conclusion, teachers addressed SPA via learner-centered teaching, alteration of activities, localization, re-teaching, self-study, improvising of resources, and collaboration among professionals. There is much evidence of teacher agency, but there is equally much indication of where school and system assistance falls short.

4. What insights and recommendations have been reported regarding the implementation of the Spiral Progression Approach in science education?

However, research findings indicate that SPA could enhance continuity and progressive conceptual understanding when meaningful connections are created between previous and new concepts. Nevertheless, the advantages of SPA are hampered by learners' poor retention, lack of enough time to teach, poorly articulated content, teachers' lack of knowledge beyond their specialization, and lack of enough resources (Orbe *et al.,* 2018; Hernandez, 2021; Degorio, 2022; Nahine *et al.,* 2024).

One major recommendation is to strengthen teacher preparation and professional development. The reviewed studies called for training that improves both subject-matter knowledge and pedagogical content knowledge, particularly in science disciplines outside teachers' original specialization (Orbe *et al.,* 2018; Manzano, 2022; Nahine *et al.,* 2024). Mentoring, peer observation, collaboration, team teaching, and sustained professional-learning opportunities were also recommended (Manzano, 2022; Mariano & Mina-Roguel, 2025).

These recommendations suggest that professional development should move beyond general orientations to SPA. Teachers need sustained, discipline-specific learning opportunities that address both what they teach and how unfamiliar scientific concepts may be represented, explained, assessed, and connected across grade levels. Mentoring and collaborative planning may be particularly valuable because they allow specialized knowledge to be shared within schools.

The studies also recommended improving instructional resources, laboratory facilities, and access to educational technology (Hernandez, 2021; Rosas, 2019; Baron & Dela Cruz, 2023). Resource provision should be understood as part of curriculum implementation rather than as an additional or optional form of support. A curriculum that expects progressively complex scientific inquiry requires corresponding laboratory, technological, and instructional resources.

Curriculum organization, sequence, pacing, and instructional time also require reconsideration. Degorio (2022) recommended improving the sequence and continuity of concepts, providing sufficient time for difficult content, and involving practicing teachers in curriculum revision. Nahine *et al.* (2024) similarly emphasized the need to align content and pacing with learners' abilities and classroom realities.

Collectively, these findings indicate that improvement requires alignment among curriculum expectations, teacher preparation, learner readiness, assessment, resources, and professional support. Addressing only one concern—for example, providing training without improving resources or revising curriculum pacing—is unlikely to resolve the interconnected difficulties experienced by teachers. A coordinated implementation strategy is therefore needed.

5. What gaps exist in the existing literature on science teachers' experiences with the Spiral Progression Approach in the Philippines?

Four major gaps were identified in the literature. First, the evidence remains geographically concentrated and context-specific. Most studies were conducted in selected schools or districts in locations such as Cavite, Batangas, Leyte, Eastern Samar, Bukidnon, Nueva Ecija, Pampanga, and General Santos City (Gonzales, 2019; Orbe *et al.,* 2018; Rosas, 2019; Hernandez, 2021; Manzano, 2022; Degorio, 2022; Baron & Dela Cruz, 2023; Nahine *et al.,* 2024; Mariano & Mina-Roguel, 2025). Several qualitative studies also involved small samples. Although these studies provide rich contextual accounts, the concentration of evidence limits understanding of whether similar experiences occur across other regions, school divisions, rural and urban settings, and public and private schools. Future research should therefore include more geographically and institutionally diverse settings.

Second, the literature is fragmented across different dimensions of SPA implementation. Studies commonly examined content mastery and out-of-field teaching (Rosas, 2019; Manzano, 2022), instructional strategies and materials (Hernandez, 2021), curriculum articulation and organization (Degorio, 2022; Nahine *et al.,* 2024), or teaching efficacy and professional development (Mariano & Mina-Roguel, 2025). Few studies examined how these dimensions interact within the complete experience of implementing SPA. This fragmentation makes it difficult to determine how curricular demands, teacher knowledge, learner readiness, instructional practices, and professional growth operate together. Future studies should employ more integrated analytical frameworks.

Third, there is not enough literature that shows how institutions affect teachers' experience through interaction between factors. It was repeatedly noted that training, mentoring, provision of materials, laboratories, ICT, timing of the curriculum, assignment of teachers, and administration support were critical factors but were always looked at separately (Orbe *et al.,* 2018; Hernandez, 2021; Manzano, 2022; Baron & Dela Cruz, 2023; Mariano & Mina-Roguel, 2025). Thus, the interactions of these support combinations on the reduction or increase of the implementation difficulty still need further research. The studies of schools as an implementation system could fill this gap.

Fourth, the data lacks a longitudinal approach. The vast majority of the available studies examined the teachers' competence, confidence, approaches to instruction, coping, and attitude toward SPA through one-time observations. There is no information about the development of teachers' competence, confidence, instructional approaches, coping strategies, and attitudes toward SPA within a long period of time. The cross-sectional data cannot answer the questions about the gradual improvement of teachers' competence in terms of multidisciplinary instruction, whether there were difficulties in implementing it, and what happened due to repetitive exposure.

When all these issues are considered collectively, it becomes clear that there is not only a lack of quantity of the literature but also a limitation of the geographic scope of analysis, its integrative capacity, institutional analysis, and consideration of the dynamics. Hence, future research should consider not just isolated cases of implementation problems, but rather the dynamic of teachers' experiences.

CONCLUSION

The Philippine literature reveals both opportunities and challenges in secondary science teachers' implementation of the Spiral Progression Approach (SPA). Across the 10 eligible studies, SPA was viewed as promoting continuous learning, reinforcing previous concepts, broadening students' exposure to science disciplines, and expanding teachers' knowledge. However, its implementation was constrained by out-of-field teaching, limited content knowledge, poor learner retention, insufficient instructional time, curriculum sequencing and pacing issues, and inadequate laboratory, ICT, and learning resources. These challenges reflect a mismatch between SPA's interdisciplinary structure and teachers' discipline-based preparation.

Teachers responded through learner-centered and collaborative strategies, including instructional modification, localization and improvisation of materials, review and reteaching, self-directed learning, mentoring, peer collaboration, and team teaching. Although these demonstrate adaptability and professionalism, effective implementation should not depend primarily on individual teacher effort. Schools and education authorities should provide continuous, subject-specific professional development, mentoring, collaborative planning, sufficient resources, and stronger institutional support. Curriculum sequencing, pacing, prerequisites, and vertical articulation should also be reviewed, with teachers involved in curriculum evaluation.

These findings remain context-specific because the included studies covered limited locations, small samples, and mostly single-time-point experiences. Further geographically diverse and longitudinal research is therefore needed to examine how teacher preparation, learner readiness, administrative support, curriculum structure, and resources shape SPA implementation.

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