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Roadmap and Lenses for Special Science Curriculum Program Implementation in a Schools Division

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ABSTRACT

This study assessed the implementation of the Special Science Curriculum Program (SCP) in the Schools Division of Marinduque, Philippines, an island province classified as a geographically isolated and disadvantaged area, examined the experiences of its implementers, and developed a contextualized policy manual to strengthen program delivery. A mixed-methods design was employed. Fifty-four internal stakeholders (nine school principals, nine SCP coordinators, and 36 key science teachers) from the nine SCP-implementing secondary schools were purposively selected to answer a validated 50-item survey questionnaire (Cronbach's α = .974) covering leadership and governance, curriculum and instruction, accountability, continuous improvement, and monitoring and evaluation. Nine participants from three purposively selected schools took part in school-based triad focus group discussions (FGDs). Survey data were analyzed using frequency counts and medians, FGD data through thematic analysis supported by document analysis, and expert validation ratings of the manual using means. SCP implementation was generally evident across all five domains (overall Mdn = 4), but medium schools obtained lower medians (Mdn = 2–3), particularly in vision-setting and planning, learning resources and facilities, research engagement, partnerships, tracer studies, and contextualized monitoring tools. Implementers reported opportunities in shared leadership, instructional practice and academic excellence, accountability and professional growth, and partnership-driven improvement, while factors and issues included limited specialized training, difficulties in scaffolding enriched content, weak monitoring tools and partnerships, governance instability, resource constraints, and teacher and learner workload pressures. The contextualized SCP Policy Manual was rated highly adequate (M = 4.6). The study concludes that SCP implementation is generally effective but not yet fully institutionalized, and that strengthening governance continuity, resources, teacher support, and monitoring systems is necessary for sustained and equitable improvement.

Keywords: *special science curriculum program, curriculum implementation, contextualized policy, shared leadership, resource constraints, continuous improvement*

INTRODUCTION

Science education plays a crucial role in national development by driving innovation, strengthening technological capacity, and supporting sustainable economic growth. Scientific literacy is increasingly regarded not only as an academic outcome but also as a civic competency that enables individuals to make informed decisions and to participate in addressing complex social, environmental, and technological challenges (UNESCO, 2021). In response, the Department of Education (DepEd) institutionalized special curricular programs at the secondary level, including the Special Science Curriculum Program (SCP), currently implemented as the Science,

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Technology, and Engineering (STE) program, to provide scientifically inclined learners with enriched opportunities for advanced learning through inquiry-based and problem-solving approaches grounded in real-world contexts (Department of Education [DepEd], 2012).

Despite these efforts, national and international assessments reveal persistent concerns. While selected Filipino students achieve recognition in international science and robotics competitions, the Philippines was among the lowest-performing countries in science in the Programme for International Student Assessment (PISA) 2018 (Organisation for Economic Co-operation and Development [OECD], 2019), and Filipino students again scored substantially below the OECD average in PISA 2022, with a mean science score of 356 against the OECD mean of 485 (OECD, 2023). These outcomes have been linked to systemic and structural constraints, including gaps in teacher preparedness, unequal access to laboratories and information and communications technology (ICT), and limitations in instructional funding and support systems (UNESCO, 2021). Budget constraints and the inequitable distribution of laboratories and science equipment persist across Philippine schools (Mangarin & Macayana, 2024). There is also a recognized need to ensure that the brightest Filipino learners, regardless of background, are nurtured and given the opportunities they deserve (Gatchalian, 2025).

Although national policies provide a broad framework, the effectiveness of programs such as the SCP depends largely on how they are adapted to local school contexts. Implementation gaps persist, including misalignment with standards, uneven resource distribution, and challenges in pedagogy and infrastructure, particularly in geographically isolated areas such as Marinduque, where access to facilities and qualified teachers is limited. Philippine studies show generally high adherence to special science curriculum guidelines alongside gaps in facilities, teacher professional development, and authentic assessment (Ortega & Chua, 2024; Toledo, 2024). Since the SCP represents the actual delivery of an enriched curriculum in classrooms, its effectiveness is shaped by governance, leadership, teacher capacity, and resource availability, which calls for localized, systematic, and context-responsive evaluation that links curriculum intent with actual practice.

This study assessed SCP implementation in the Schools Division of Marinduque, examined the experiences of SCP implementers, and developed a contextualized policy manual to serve as a roadmap for program enhancement. Specifically, it sought to (a) assess the implementation of the SCP in terms of leadership and governance, curriculum and instruction, accountability, continuous improvement, and monitoring and evaluation; (b) inquire into the experiences of SCP implementers; and (c) create a contextualized policy manual to enhance SCP implementation in science. The study focused on implementation processes rather than learner achievement outcomes and was limited to internal stakeholders of the nine STE-implementing public secondary schools identified in Regional Memorandum No. 42, s. 2023. Its findings may guide school administrators in managing and sustaining the program, support science teachers through improved instructional assistance, inform parents of the value of a well-structured specialized curriculum, benefit learners through curriculum enhancements, and provide future researchers with a methodological reference for program evaluation.

Literature Review

The Special Science Curriculum Program in the Philippines

Under the K to 12 curriculums, the special program in science remains part of the Philippine education system. The STE program, formerly the Engineering and Science Education Project of DepEd, offers learners an enhanced science and technology-oriented curriculum with a strong focus on science, mathematics, and research, aimed at developing science process skills through an inquiry- and outcomes-based approach (DepEd, 2012). Its vision is to produce responsible and morally upright graduates from schools offering relevant and innovative science and mathematics education (Camara, 2018).

The program extends the regular junior high school curriculum through advanced science and mathematics instruction, additional learning time, research subjects, and enrichment activities. Constructivist perspectives support this design, emphasizing that learners construct knowledge through active engagement with meaningful problems (Schunk, 2020), and evidence indicates that guided inquiry produces stronger learning than

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unguided discovery, particularly in complex scientific tasks (Lazonder & Harmsen, 2016). Studies of inclusive STEM-focused high schools report positive effects on science outcomes and STEM-readiness indicators, although effects vary by site and depend on implementation quality (Means et al., 2021).

Philippine evaluations of special science programs show both strengths and persistent gaps. Toledo (2024) reported a high extent of implementation of the Special Science Curriculum in the Division of Rizal, while an impact assessment of the revitalized STE program identified needs related to facilities, teacher development, and program support (Ortega & Chua, 2024). Prado and Sabas (2023) found that the implementation of a special science elementary curriculum was associated with school performance and instructional leadership, underscoring the role of leaders in sustaining specialized programs. Persistent shortages of laboratory facilities and equipment further limit hands-on science learning in public schools (Mangarin & Macayana, 2024).

Leadership, Governance, and Accountability in Program Implementation

Leadership and governance provide the structural, procedural, and strategic direction necessary to ensure program fidelity, coherence, and sustainability. Effective leadership extends beyond administrative management to instructional leadership, in which school heads shape teaching practices, monitor instruction, and promote a shared vision, and its effects depend strongly on context (Hallinger, 2018). Successful school leaders build vision, develop people, redesign the organization, and improve the instructional program, and much of their influence works through distributed arrangements involving teachers and other stakeholders (Leithwood et al., 2020).

Distributed leadership treats leadership as a practice shared among multiple actors rather than confined to a single formal role, but its benefits depend on clear roles and supportive organizational routines (Tian et al., 2016). In Philippine schools, the School Improvement Plan (SIP) serves as a participatory framework for identifying needs, setting priorities, and designing interventions, and stakeholder involvement in its formulation fosters shared ownership of school programs (Nicdao & Ancho, 2020). DepEd's School-Based Management framework likewise institutionalizes participatory governance through structures such as School Governing Councils.

Accountability in SCP implementation refers to the system of policies, roles, standards, and monitoring mechanisms that ensure schools deliver the program according to DepEd guidelines and intended learning outcomes. DepEd Order No. 46, s. 2012 sets the admission and retention requirements of special curricular programs, while DepEd Order No. 8, s. 2015 and DepEd Order No. 31, s. 2020 define the classroom assessment and grading systems that align evaluation with learning outcomes (DepEd, 2012, 2015, 2020). Data-based decision-making strengthens accountability when schools systematically use evidence on learner progress to inform instructional improvement rather than merely to demonstrate compliance (Schildkamp, 2019).

Curriculum, Instruction, and Teacher Capacity

Instructional delivery in the SCP is shaped by class size, instructional time, teacher expertise, and the availability of laboratories, ICT facilities, and current instructional materials. Learning environments that support inquiry require adequate physical infrastructure, and the World Bank synthesis by Barrett et al. (2019) shows that school facilities affect learning, particularly where instruction depends on well-equipped spaces. Without functional laboratories and resources, science teaching tends to remain theoretical, limiting opportunities for experimentation and research.

Teacher capacity is central to bridging curriculum intent and classroom practice. Effective professional development is sustained, content-focused, collaborative, and embedded in practice, rather than delivered as isolated training (Darling-Hammond et al., 2017), and learning environments that respond to learner diversity are grounded in the science of learning and development (Darling-Hammond et al., 2020). Differentiated instruction, which the SCP requires to accommodate varied learner needs, depends on teachers' pedagogical knowledge, continuing professional development, and access to varied instructional materials (Pozas et al., 2020; Suprayogi et al., 2017).

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Workload conditions also influence how fully teachers can implement enriched curricula. Skaalvik and Skaalvik (2017) found that school goal structures and teacher self-efficacy were associated with job satisfaction and emotional exhaustion, suggesting that excessive demands without adequate support can undermine teachers' motivation and effectiveness. For learners, sustained academic stress can negatively affect engagement and well-being in secondary school (Pascoe et al., 2020).

Continuous Improvement, Monitoring, and Evaluation

Continuous improvement refers to an ongoing, systematic process of enhancing program effectiveness through evaluation, feedback, reflection, and evidence-based decision-making. Schools that function as learning organizations embed collective inquiry, continuous learning, and systems thinking into their routines (Stoll & Kools, 2017), and teacher communities such as Learning Action Cells (LACs) and professional learning communities support professional development through collaboration and shared responsibility (Vangrieken et al., 2017). Collaborative professionalism further enables teachers to learn from one another and improve practice collectively (Hargreaves & O'Connor, 2018).

Monitoring and evaluation (M&E) link policy intentions with school-level implementation by tracking inputs, processes, outputs, and outcomes. Mechanisms such as technical working groups, standardized admission procedures, classroom supervision, tracer studies, and the combination of internal and external evaluation allow schools to judge both compliance and long-term effectiveness. Research–practice partnerships can support these processes by connecting schools with external expertise, although their benefits depend on sustained and well-structured collaboration (Coburn & Penuel, 2016).

Theoretical Framework

The study drew on models of curriculum change and implementation. The Concerns-Based Adoption Model (CBAM) describes how teachers progress through stages of concern and levels of use before fully integrating an innovation, implying that implementation support should be sustained and responsive to teachers' evolving concerns (Hall & Hord, 2020). Related models, namely the Overcoming Resistance to Change, Leadership-Obstacle Course, RAND Change Agent, and Linkage models, frame curriculum change as a human and organizational process shaped by stakeholder readiness, leadership in navigating obstacles, organizational and resource conditions, local adaptation, and linkages between knowledge producers and users. Fullan (2016) similarly argues that educational change succeeds when policy is translated into shared meaning and capacity at the school level.

Four broader perspectives complemented these models. Transformational and instructional leadership perspectives explain how leaders articulate vision and build collective capacity (Leithwood et al., 2020). Constructivist and active learning perspectives explain the pedagogical foundations of the SCP (Schunk, 2020). Ecological and systems-based perspectives frame program effectiveness as the product of interacting layers, including leadership, teacher capacity, resources, community involvement, and policy (Darling-Hammond et al., 2020). Innovation implementation and diffusion perspectives explain how programs are adopted, adapted, and sustained through perceived usefulness, contextual compatibility, and enabling support (Fullan, 2016). Together, these lenses framed SCP implementation as an interaction of human, organizational, and systemic factors.

Research Gap and Research Paradigm

Existing Philippine studies on special science programs largely describe the extent of implementation or program impact at the division or national level (Ortega & Chua, 2024; Prado & Sabas, 2023; Toledo, 2024), while international literature provides general principles of leadership, professional learning, and M&E. Limited evidence links domain-level assessment of SCP implementation with implementers' own experiences in a geographically isolated island division, and few studies translate such findings into a validated, contextualized policy instrument. This study addressed that gap by combining survey, FGD, and document evidence to develop a contextualized SCP policy manual for the Schools Division of Marinduque.

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Figure 1 presents the research paradigm, conceptualized as a hand lens symbolizing focused examination, reflection, and continuous improvement. At its center is the implementation of the SCP in science, assessed through five domains: leadership and governance, curriculum and instruction, accountability, continuous improvement, and monitoring and evaluation. Survey questionnaires answered by principals or school heads, SCP coordinators, and key SCP teachers provided quantitative data, while school-based FGDs explored opportunities, challenges, factors, and issues. The data were analyzed and synthesized across the five domains, converging in the contextualized policy manual as the output of the study.

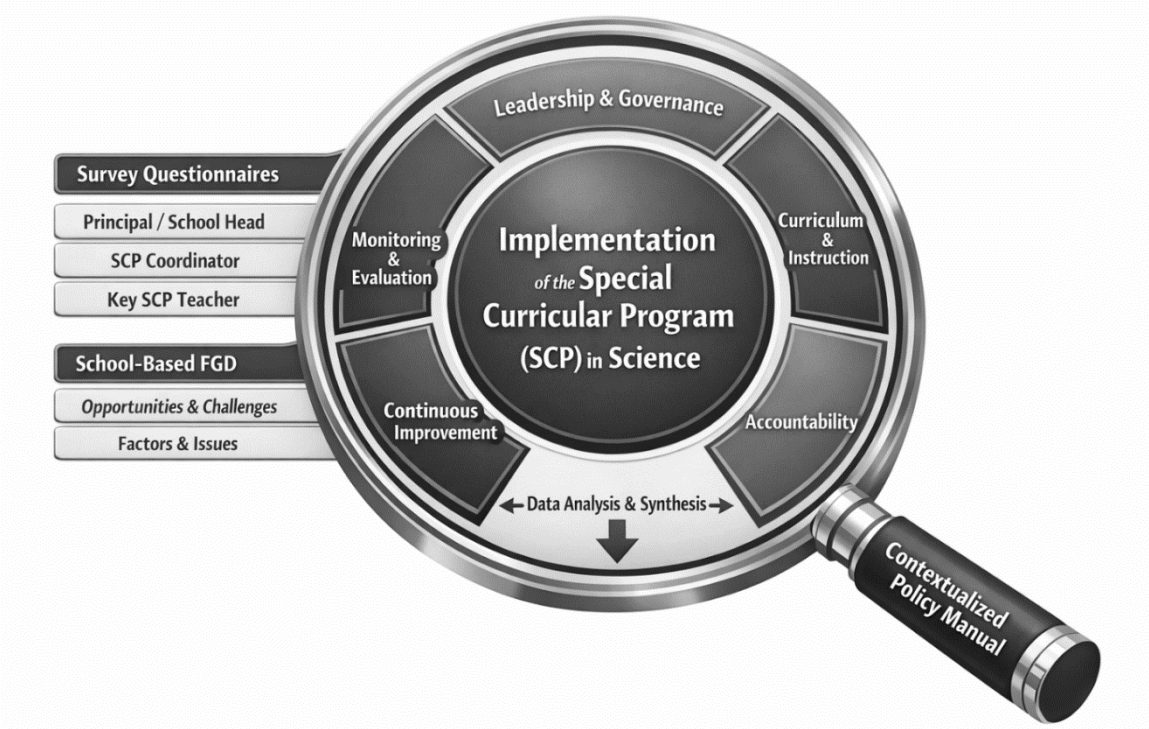


Figure 1. *The Research Paradigm*

METHODS

Research Design

The study employed a mixed-methods design aligned with an explanatory sequential approach and policy-oriented outcomes. A quantitative descriptive survey assessed SCP implementation across the five domains. A qualitative case study design was used to explore implementers' experiences in depth, and the combination of designs allowed triangulation to strengthen the validity of the findings (Creswell & Plano Clark, 2018). A developmental research design (design and development model) was used to create and validate the contextualized policy manual.

Research Locale

The study was conducted in the Schools Division of Marinduque, a heart-shaped island province in the MIMAROPA Region composed of six municipalities: Boac, Mogpog, Santa Cruz, Buenavista, Torrijos, and Gasan. As a Geographically Isolated and Disadvantaged Area, the province faces constraints in access to instructional resources, professional development, and infrastructure because of distance, terrain, and

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transportation. The division comprises nine school districts, including seven island schools reachable only by motorized boat and about 30 far-flung schools accessible by long-distance walking. It oversees 183 public and 10 private elementary schools, 46 public and 15 private secondary schools, one state university, and 114 Community Learning Centers serving approximately 61,449 learners in formal education and 1,252 in the Alternative Learning System, supported by 2,758 teaching and 434 non-teaching personnel (Lincallo, 2025). All nine SCP-implementing secondary schools in the division were included: Marinduque, Landy, Makapuyat, Matalaba, Matuyatuya, Tigwi, Buenavista, Bognuyan, and Bangbang National High Schools.

Participants and Sampling Technique

Purposive sampling was used to select internal stakeholders directly involved in SCP planning, delivery, management, and evaluation. Survey respondents had to be a school principal, an SCP coordinator, or a key science teacher handling SCP class, with at least a Very Satisfactory performance rating in the most recent rating period and at least five years of experience in the SCP. A total of 54 respondents answered the survey. For the school-based FGDs, three of the nine schools were purposively selected with guidance from the Division SCP Focal Person to reflect variation in school size (very large, large, and medium) and geographic distribution (upland and lowland). Each triad consisted of the school principal, the SCP coordinator, and a key teacher with at least five years of teaching experience recommended by the principal. Table 1 presents the distribution of participants.

Table 1. *Distribution of Survey Respondents and FGD Participants*

Group	Survey questionnaire	School-based FGD (triad)
By role		
School principal	9	3
SCP coordinator	9	3
Key science teacher	36	3
By school size (survey)		
Medium (441–840 learners)	15	—
Large (841–1,240 learners)	18	—
Very large (above 1,240 learners)	21	—
Total	54	9

Note. No small schools (fewer than 440 learners) implemented the SCP. FGD schools were one very large, one large, and one medium school.

Research Instrument

A researcher-developed survey questionnaire based on School-Based Management principles and aligned with SCP implementation standards contained 50 indicators, ten for each domain, rated on a five-point scale: 5 = highly evident (100% implemented), 4 = evident (75%), 3 = moderately evident (50%), 2 = slightly evident (25%), and 1 = not evident (not implemented). Content validity was established by three experts using an adapted validation tool: two secondary school heads holding doctorate degrees evaluated content, relevance, and alignment, while a Master Teacher in English reviewed clarity and language. Reliability testing with 30 cases yielded a Cronbach's alpha of .974 across the 50 items, indicating excellent internal consistency.

A semi-structured FGD guide with ten core questions on the opportunities brought by SCP implementation and the factors and issues affecting it was developed with the research adviser, validated by the same experts, and pilot-tested with school heads and science teachers from non-SCP schools to check clarity, sequencing, and relevance. A document analysis checklist covering DepEd issuances, SIPs, instructional materials, training records, monitoring reports, and learner performance data was used to corroborate survey and FGD findings. An expert validation checklist assessed the policy manual using Likert-scale ratings and open-ended feedback, consistent with recommended practice in instrument development (Boateng et al., 2018).

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Data Gathering Procedure

Permission was secured from the Schools Division Superintendent through a request endorsed by the Senior Education Program Specialist for Planning and Research. Endorsement letters, validated instruments, invitation letters, and informed consent forms were transmitted to the Public Schools District Supervisors, who coordinated schedules so that instructional time was not disrupted, in line with DepEd Order No. 9, s. 2005 (DepEd, 2005). The survey was administered through a Google Forms link to respondents with stable internet access and in print to those with limited connectivity. The FGDs were held in private venues within school premises, lasted approximately 100 to 120 minutes each, and were facilitated by the researcher in a neutral role. All sessions were audio-recorded with consent and transcribed verbatim. Participants reviewed and signed their transcripts during member checking. The draft policy manual was then validated by three experts directly involved in SCP implementation.

Data Analysis

Survey data were analyzed using frequency counts and medians for each indicator, disaggregated by school size (medium, large, and very large) and summarized per domain. FGD transcripts were analyzed thematically: transcripts were read repeatedly, meaningful segments were coded, verbatim statements were reduced to meaning units in a coding matrix organized by research question, and codes were clustered and iteratively refined into major themes and sub-themes (Creswell & Poth, 2018). Document analysis was used to triangulate emerging themes. Expert validation ratings of the policy manual were summarized using means, with the following interpretation: 5 = highly adequate, 4 = adequate, 3 = moderately adequate, 2 = inadequate, and 1 = poor. Validators' narrative comments were analyzed thematically and used to refine the manual.

Ethical Consideration

The study adhered to the principles of respect for persons, beneficence, and justice. All respondents and participants received and signed informed consent forms explaining the objectives, procedures, expected duration, potential risks and benefits, and confidentiality measures. Participation was voluntary, and participants could decline, withdraw, or skip questions without consequence. FGD participants were identified by codes such as S1-P (School 1 Principal), S1-SC (SCP Coordinator), and S1-KT (Key Teacher), which were used consistently in transcription, analysis, and reporting. Data were stored securely and used solely for research purposes, and findings were reported accurately without manipulation.

RESULTS AND DISCUSSION

Implementation of the Special Science Curriculum Program

Table 2 summarizes the extent of SCP implementation by domain and school size. Across all five domains, implementation was evident (overall Mdn = 4), indicating that processes and procedures were perceived to be implemented at approximately the 75% level. Disaggregation, however, revealed a consistent gap: large and very large schools generally obtained medians of 4 or 5, whereas medium schools obtained medians of 2 to 3. The widest gap was in leadership and governance, where medium schools registered a median of 2 (slightly evident), compared with 4 (evident) in larger schools.

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Table 2. *Extent of SCP Implementation by Domain and School Size*

Domain	Medium	Large	Very large	Overall
Leadership and governance	2 (SE)	4 (E)	4 (E)	4 (E)
Curriculum and instruction	3 (ME)	4 (E)	5 (HE)	4 (E)
Accountability	3 (ME)	4 (E)	4 (E)	4 (E)
Continuous improvement	3 (ME)	4 (E)	4 (E)	4 (E)
Monitoring and evaluation	3 (ME)	4 (E)	4 (E)	4 (E)

Note. Values are medians. *n* = 15 (medium), 18 (large), 21 (very large), 54 (overall). HE = highly evident; E = evident; ME = moderately evident; SE = slightly evident; NE = not evident.

In leadership and governance, the use of relevant guidelines and the latest issuances was evident in all school types and highly evident in very large schools (Mdn = 5), showing schools' capacity to translate DepEd directives into practice. Medium schools, however, registered a median of 2 on vision-setting aligned with school improvement planning, collaborative development and review of the SIP, organizational structures for shared leadership, role definition, adaptive mechanisms, and operational governance structures such as the School Governing Council (Table 3). These results suggest that planning in medium schools may be compliance-oriented rather than strategic and that leadership functions are not yet embedded in formal structures. Distributed leadership becomes effective only when roles are clearly defined and supported by organizational routines (Tian et al., 2016), and participatory SIP formulation is essential for shared ownership of school programs (Nicdao & Ancho, 2020).

Table 3. *Indicators with the Lowest Implementation Ratings in Medium Schools*

Indicator	Medium	Large	Very large	Across schools
Leadership and governance				
Formulation of a clear SCP vision aligned with school improvement planning	2	4	4	4
Use of a collaboratively crafted development plan (e.g., SIP)	2	3	4	3.5
Regular review of the development plan by the school community	2	4	4	4
Clear structure and work arrangements promoting shared leadership	2	4	4	4
Definition of roles and responsibilities of internal and external stakeholders	2	4	4	4
Availability of adaptive mechanisms to emerging SCP challenges	2	4	4	4
Operational internal governance structures (e.g., SGC) overseeing SCP	2	4	4	4
Curriculum and instruction				
Development of inclusive and current learning resources supporting SCP objectives	2	4	5	4
Availability of a functional library and computer laboratory	2	4	4	4
Availability of an equipped and properly managed science and mathematics laboratory	2	4	4	4
Accountability				
Longitudinal tracking of learners' performance against SCP objectives	2	4	4	4
Continuous improvement				
Conduct of research studies for continual review and improvement of SCP	1	4	4	4
Presence of partnerships with stakeholders	2	3	4	4
Participation of SCP teachers in seminars, conferences, and workshops	2	3	4	4

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Indicator	Medium	Large	Very large	Across schools
Benchmarking, pilot-testing, and assessment of SCP innovations	2	4	4	4
Allotment and utilization of sufficient MOOE for SCP implementation	2	4	4	4
Monitoring and evaluation				
Presence of a technical working group for monitoring and evaluation	2	4	4	4
Conduct of tracer studies among program completers	1	3	3	3
Availability of a contextualized policy manual for monitoring and evaluation	1	3	3	3

Note. Values are medians as reported in the study. Indicators shown are those with a median of 2 or lower in medium schools.

Curriculum and instruction were highly evident in very large schools (Mdn = 5), evident in large schools (Mdn = 4), and moderately evident in medium schools (Mdn = 3). Structural and policy-related indicators were strong across schools: the inclusion of add-on subjects, the ideal class size of at most 35 learners, adherence to the grading and assessment orders, and adherence to admission, retention, and transfer policies were highly evident across schools. Medium schools, however, rated the development of inclusive and current learning resources and the availability of functional libraries, computer laboratories, and science laboratories as slightly evident (Mdn = 2), and differentiated instruction and longer instructional time as moderately evident (Mdn = 3). Medium schools thus complied with structural requirements but faced constraints in resource-supported and differentiated instruction. Effective differentiation requires pedagogical knowledge, continuing professional development, and varied materials (Pozas et al., 2020; Suprayogi et al., 2017), and inadequate facilities restrict inquiry-based learning (Barrett et al., 2019).

Accountability was evident overall (Mdn = 4), with several indicators highly evident across schools: the conduct of campaign programs prior to admission, the alignment of teachers' specialization with the science and mathematics subjects they handle, the presentation of SCP progress reports to the school community, and adherence to DepEd-approved accountability mechanisms. Medium schools obtained a median of 3, and the weakest area was the longitudinal tracking of learner performance against SCP objectives (Mdn = 2). Without systematic tracking of learner progress over time, schools are less able to engage in evidence-based improvement (Schildkamp, 2019).

Continuous improvement and M&E were likewise evident overall (Mdn = 4) but moderately evident in medium schools (Mdn = 3). In continuous improvement, medium schools rated the conduct of research studies for program review as not evident (Mdn = 1) and rated partnerships with stakeholders, teacher participation in seminars and conferences, benchmarking and pilot-testing of innovations, and allotment of Maintenance and Other Operating Expenses (MOOE) for the SCP as slightly evident (Mdn = 2). In M&E, procedural components such as pre-screening and shortlisting of applicants and the use of prescribed admission examinations were highly evident across schools, as were stakeholder inclusion in M&E and classroom supervision (Mdn = 4.5). Developmental components were weaker: tracer studies of program completers and the availability of a contextualized M&E policy manual were only moderately evident across schools (Mdn = 3) and not evident in medium schools (Mdn = 1). These patterns indicate that monitoring in medium schools tends to remain procedural, a condition associated with the absence of structured routines and collaborative cultures for using data (Schildkamp, 2019).

Overall, the quantitative results show a tiered pattern of implementation, in which larger schools display more mature and systematized practices while medium schools remain in a developmental stage. This is consistent with the observation that reforms vary in depth because of differences in institutional capacity, leadership, and context (Fullan, 2016). The strengths of large and very large schools in learning resources, differentiated instruction, facilities, and monitoring systems also position them as potential partners for medium schools through resource sharing, mentoring, cluster-based professional development, and shared laboratory access. Collaborative

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professionalism and collective efficacy are recognized drivers of improvement when schools pool expertise and address common challenges together (Donohoo et al., 2018; Hargreaves & O'Connor, 2018).

Experiences of SCP Implementers: Opportunities

Table 4 presents the opportunities that implementers associated with SCP implementation. The first theme, strengthened shared leadership and collective decision-making, reflects a shift from centralized governance toward collaborative structures. A principal stated, "SCP has really opened doors for a more collaborative leadership structure… responsibilities aren't just centralized with me" (S1-P), and described "monthly STE Committee meetings… quarterly faculty meetings… LAC sessions… and annual planning sessions where we decide curriculum, schedules, and budget together" (S1-P). Teachers reported a stronger voice in curriculum development, although "Even if final decisions rely on the principal, teachers are actively involved in curriculum planning and program implementation" (S2-SC). This balance of hierarchical and participatory leadership is consistent with evidence that leadership influence is strongest when principals and teachers jointly shape instructional goals (Leithwood et al., 2020), while distributed practices still tend to operate within principal-led frameworks when institutional structures do not fully support teacher involvement (Tian et al., 2016).

Table 4. *Opportunities Brought by the Implementation of the SCP*

Major theme	Sub-themes	Illustrative significant statement
Strengthened shared leadership and collective decision-making	Institutionalized collaborative governance structures; empowered teacher participation in curriculum leadership	"Regular coordination meetings and program reviews are becoming institutionalized… it fosters a culture of shared accountability and ownership." (S1-SC)
Improved instructional practices and academic excellence	Shift to student-centered and inquiry-based instruction; enhanced academic performance and school reputation	"Teachers now integrate STEM, flipped classroom strategies, and differentiated instruction." (S2-SC)
Strengthened institutional accountability and professional growth	Capacity building and teacher professional development; monitoring, mentoring, and performance-based accountability	"Peer mentoring and collaboration help improve teaching practices and accountability." (S2-SC)
Continuous improvement through innovation, partnerships, and evidence-based management	Strong stakeholder partnerships and resource mobilization; evidence-based monitoring, innovation, and sustainability practices	"Without community partnerships, it would be difficult to sustain SCP needs and co-curricular programs." (S2-P)

Note. S = school; P = principal; SC = SCP coordinator; KT = key teacher.

The second theme, improved instructional practices and academic excellence, describes a shift from lecture-based teaching to inquiry-based, project-based, and research-oriented approaches. As one coordinator explained, "SCP has shifted our teachers from lecture-based methods toward inquiry-based and research-oriented approaches" (S1-SC), and a teacher added, "I've adopted project-based learning, laboratory investigations, and real-world applications… students are more engaged" (S1-KT). These shifts reflect experiential learning, in which understanding deepens through authentic tasks, reflection, and application (Kolb & Kolb, 2018), and guided inquiry, which supports stronger science learning (Lazonder & Harmsen, 2016). Participants linked these practices to recognition in science competitions and to graduates who became STEM achievers, including DOST scholars (S3-P).

The third theme, strengthened institutional accountability and professional growth, combined capacity building with developmental monitoring. One principal noted, "SCP has pushed us to invest more in teacher training and capability-building despite limited funding" (S1-P), while a teacher reported attending "professional development programs I wouldn't have accessed otherwise" (S1-KT). Classroom observation with feedback, peer mentoring, and the use of student portfolios and competition outputs formed a multidimensional accountability

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system. This integration of monitoring with mentoring aligns with research showing that effective professional development is sustained, collaborative, and practice-embedded (Darling-Hammond et al., 2017) and that teacher communities support professional learning (Vangrieken et al., 2017). The fourth theme, continuous improvement through innovation, partnerships, and evidence-based management, reflects partnerships with local government units, the provincial government, alumni, and DepEd, which provide materials, funding, and visibility, together with the use of evaluation criteria and monitoring results to guide planning, budgeting, and interventions.

Experiences of SCP Implementers: Factors and Issues

Table 5 presents the factors and issues that affected SCP implementation. Among the factors, instructional capacity was constrained by limited specialized training and misalignment between teacher specialization and assigned subjects: "Some teachers are handling subjects outside their specialization…" (S3-SC), and "We need more specialized teachers, especially for Research, Physics, and Chemistry" (S3-P). Professional development opportunities were reported to be infrequent, and "many require travel off island" (S2-KT), reflecting inequities in access for island schools. Sustained, job-embedded professional development is essential for effective inquiry-based teaching (Darling-Hammond et al., 2017), and the island context makes such access particularly difficult.

Table 5. *Factors and Issues Affecting the Implementation of the SCP*

Major theme	Sub-themes	Illustrative significant statement
Factors		
Instructional capacity	Limited specialized training	"Opportunities are infrequent, and many require travel off island…" (S2-KT)
Lesson content	Struggles in enrichment and scaffolding lessons	"Research should be more scaffolded and supported." (S1-KT)
Systemic support and feedback	Deficient tools for accountability and monitoring; limited partnerships	"We do not have a digital system for tracking student progress." (S1-SC)
Issues		
Governance instability and policy implementation gaps	Leadership turnover and weak program continuity; weak communication and delayed dissemination of directives	"There are times when we only learn about new directives or required documents during visits or inspections…" (S1-KT)
Resource constraints and instructional limitations	Inadequate laboratory facilities and materials; budget and infrastructure limitations	"We lack updated science references, laboratory manuals, and supplementary materials." (S2-SC)
Teaching and learning load pressures	Teacher overload and multitasking roles; student academic overload and fatigue	"Our two Research teachers handle Research I, II, III, and IV across Grades 7 to 10." (S1-SC)

The lesson content factor concerned difficulties in contextualizing and scaffolding enriched and accelerated competencies. A principal observed that "teachers struggle to contextualize competencies" (S2-P), and a teacher noted, "We often improvise using locally sourced materials… but it only approximates expectations" (S2-KT). Research and investigatory projects were especially demanding, since "Students are expected to produce outputs… but many need step-by-step guidance" (S1-KT). Inquiry is most effective when appropriately guided (Lazonder & Harmsen, 2016). The systemic support and feedback factor reflected the absence of an SCP-specific accountability tool and a digital system for tracking learner progress, together with limited partnerships with universities and non-government organizations. Research–practice partnerships can strengthen implementation, but they must be structured and sustained to yield lasting benefits (Coburn & Penuel, 2016).

Among the issues, governance instability and policy implementation gaps were most salient. Turnover of school heads, teachers, and coordinators disrupted continuity because "not all leaders are equally familiar with SCP mandates" (S1-P). Coordinators carried full teaching loads without a separate Plantilla position, and directives were sometimes learned only "during visits or inspections" (S1-KT). These findings show that SCP

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implementation is person-dependent rather than system-based, which weakens institutional memory during transitions. Distributed leadership persists through personnel changes only when it is embedded in organizational routines and clearly defined roles (Tian et al., 2016), and reform depth depends on shared meaning and capacity across the organization (Fullan, 2016).

Resource constraints and instructional limitations included the lack of "advanced chemistry glassware and reagents, physics apparatus… and even enough microscopes" (S1-KT), outdated references and laboratory manuals, the need for additional classrooms, laboratory rooms, and ICT equipment, and inconsistent budgetary support. These conditions corroborate the low survey ratings on facilities and MOOE in medium schools and are consistent with documented shortages of laboratory facilities in Philippine schools (Mangarin & Macayana, 2024) and with evidence on the effects of school infrastructure on learning (Barrett et al., 2019). Teaching and learning load pressures affected both teachers and learners: two research teachers handled Research I to IV across Grades 7 to 10, which limited one-on-one mentoring, while learners managing core and add-on subjects showed fatigue when deadlines overlapped, and some considered transferring to regular classes. Excessive teacher workload is associated with emotional exhaustion (Skaalvik & Skaalvik, 2017), and sustained academic stress and burnout can reduce learners' engagement and achievement (Madigan & Curran, 2021; Pascoe et al., 2020).

Contextualized SCP Policy Manual

The contextualized SCP Policy Manual was developed directly from these findings. Themes on leadership turnover and weak continuity informed provisions on governance structures and defined roles for SCP coordinators and school leaders. Findings on resource constraints led to guidelines on minimum resource requirements, laboratory standards, and flexible implementation strategies. Gaps in instructional capacity informed provisions for continuous, targeted professional development, while gaps in monitoring and accountability informed the inclusion of standardized tools, templates, and suggested digital tracking mechanisms. In this way, the manual translates national policy into operational guidelines suited to an island division, consistent with the view that curriculum development should integrate empirical evidence with policy intent (Ornstein & Hunkins, 2018).

Table 6. *Expert Validation of the Contextualized SCP Policy Manual*

Criterion	Mean	Verbal interpretation
Clarity	4.9	Highly adequate
Relevance	5.0	Highly adequate
Comprehensiveness	4.4	Adequate
Practicality	4.4	Adequate
Acceptability	4.8	Highly adequate
Overall	4.6	Highly adequate

Note. Three expert validators. 5 = highly adequate (exceeds expected standards); 4 = adequate (meets standards, minor refinement needed); 3 = moderately adequate; 2 = inadequate; 1 = poor.

As shown in Table 6, experts rated the manual highly adequate (overall M = 4.6). Relevance received a perfect rating (M = 5.0), indicating strong alignment with the actual needs of SCP implementation, and clarity (M = 4.9) and acceptability (M = 4.8) were likewise rated highly adequate. Comprehensiveness and practicality (M = 4.4 each) were rated adequate, suggesting that further elaboration of procedures, additional examples, expanded tools and templates, and simplification for resource-constrained schools would strengthen the manual. The ratings indicate that the manual is contextually relevant and acceptable to practitioners. Educators are more likely to enact reforms that they perceive as relevant, feasible, and grounded in their own practice (Datnow, 2020).

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CONCLUSION

The implementation of the Special Science Curriculum Program in the Schools Division of Marinduque is generally effective and functioning within acceptable standards, as shown by an overall median of 4 (evident) across leadership and governance, curriculum and instruction, accountability, continuous improvement, and monitoring and evaluation. The SCP is not merely a policy mandate but is actively operationalized in schools; however, its implementation remains uneven and not yet fully institutionalized, particularly in medium schools, where vision-setting and planning, learning resources and facilities, research engagement, partnerships, longitudinal tracking, tracer studies, and contextualized monitoring tools lag behind those of larger schools.

The SCP generates significant opportunities for educational advancement by strengthening shared leadership, improving instructional practices and academic excellence, enhancing accountability and professional growth, and promoting innovation through partnerships. These gains show that the program can serve as a catalyst for school transformation when adequately supported. Its effectiveness, however, is constrained by interrelated factors and issues, including limited specialized training, difficulties in scaffolding enriched content, weak monitoring tools and partnerships, governance instability, resource constraints, and workload pressures on teachers and learners. These indicate that teacher preparedness, curriculum demands, and institutional support structures are not yet fully aligned with program expectations.

The highly adequate contextualized SCP Policy Manual demonstrates that a data-driven and context-responsive policy intervention is both necessary and feasible. By linking domain-level assessment with implementers' experiences, the study contributes a localized roadmap for strengthening governance continuity, instructional support, resource provision, and monitoring in a geographically isolated division. Because the findings were drawn from the nine SCP-implementing schools of one division and relied on internal stakeholders' perceptions, they describe implementation in this context and may be transferable, with caution, to similarly situated divisions.

Recommendation

To strengthen governance stability and program continuity, the Schools Division and school heads may institutionalize a permanent SCP governance structure by designating trained and stable SCP coordinators and establishing clear succession protocols during leadership transitions. To improve instructional quality and teacher preparedness, the division may implement targeted and continuous professional development on Physics, Chemistry, Research, and inquiry-based pedagogies, including structured upskilling for teachers handling subjects outside their specialization and options that reduce the need for off-island travel.

To enhance curriculum delivery, schools may adopt scaffolding tools, contextualized instructional materials, and standardized research templates to support enrichment activities and investigatory projects. To improve resource allocation, an SCP budget line may be mandated at the school level, with clear provisions for laboratory equipment, instructional materials, ICT resources, and facility improvement, so that SCP requirements are prioritized in annual planning and budgeting.

To strengthen monitoring, evaluation, and accountability, a standardized digital SCP monitoring system and unified accountability tools may be developed and implemented across schools to improve data tracking, reduce documentation burden, and support evidence-based decisions, including longitudinal tracking of learners and tracer studies of program completers. To enhance institutional support, formal collaborations with universities, local government units, non-government organizations, and science institutions may be established to support laboratory access, research mentoring, and teacher capacity building. Large and very large SCP schools may also serve as partner institutions for medium schools through mentoring, resource sharing, and cluster-based professional learning.

Future researchers may conduct longitudinal evaluations of SCP outcomes, comparative analyses across divisions, and studies of the program's effects on learner performance, including the perspectives of learners, parents, and external stakeholders. The contextualized SCP Policy Manual may be implemented, further refined,

and validated in broader settings to examine its scalability, sustainability, and alignment with evolving educational demands.

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