THE QUEST
ISSN 1908-3211 (Online) | ISSN 1908-322X (Print)
Journal of Multidisciplinary Research and Development

P-ISSN: 1908-322X and E-ISSN: 1908-3211
Vol. 4 No. 1 (2025)
Received: 03-04/ Revised: 05-06/ Accepted:06-30-2025
https://neust.journalintellect.com/quest

Revisiting the Junior High School K to 12 Science Curriculum of Selected Regions in the Philippines

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Abstract. This study examines the implementation status of the K to 12 Junior High School Science Curriculum in the Philippines, addressing a knowledge void gap for research conducted post-2020. Previous studies have primarily focused on specific regions, limiting their applicability across diverse educational contexts. By employing a descriptive-survey design, the research assesses participants' perceptions of the Science curriculum's effectiveness based on three critical dimensions of practical curriculum implementation. The study gathers responses from 16 school heads and 144 science teachers across Regions I, III, and V. A structured questionnaire, adapted from prior research, evaluates demographic factors such as sex, position, educational attainment, years of service, regional location, school size, and classification. Descriptive statistics provide an overview of perceptions, while inferential tests (Mann-Whitney U Test and Kruskal-Wallis Test) evaluate differences based on demographic profiles. Findings reveal that while the curriculum benefits from teacher expertise and adherence to standards, challenges remain regarding print resource availability, instructional time, parental involvement, and teacher engagement in curricular decisions.

Keywords: K to 12 Science Curriculum, Curriculum Implementation, Resource and Process Variables, Teacher and School Demographics, Curriculum Challenges and Effectiveness

1. Introduction

The K to 12 educational reform in the Philippines, officially launched in 2012, was designed to enhance the overall quality of education by extending basic education from ten to twelve years, thereby aligning the Philippine educational system with international standards. The curriculum adheres to a spiral progression approach (Reyes & Dizon, 2015, as cited by Baron & Cruz, 2023). Corpuz (2014), Cabansag (2014) and Resurreccion and Adanza (2015) further explain that as learning advances in this spiral approach, more specifics are introduced while the basics are reemphasized and rediscovered multiple times, leading to mastery of the teachings. Despite these benefits, challenges remain that affect the K to 12 curriculum's overall effectiveness (Mangali, Tongco, Aguinaldo, and Calvadores, 2019)

Traditionally, basic science education was taught separately, with subjects like general science, biology, chemistry, and physics changing each year in the old four-year high school curriculum. In contrast, the K to 12 curriculum teaches physics, biology, chemistry, and earth and space sciences simultaneously from Grade 3 through junior high, using a spiral progression approach.

Students have reported positive experiences with the K to 12 science curriculum, particularly in developing scientific skills, concept understanding, and values (Montebon, 2014, as cited by Tirol, 2022). Similarly, teachers in Iloilo Province generally view the implementation of science standards as effective, noting that instructional materials are adequate, though laboratory facilities could be improved (Torres, 2023).

However, not all feedback was positive. Cabansag (2014) also found that teachers are pressured to deliver spiral progression topics and using proficiency-based grading. This pressure underscores the need for comprehensive training to meet pedagogical content knowledge (PCK) requirements for transitioning between physics, chemistry, biology, and earth science topics (Ligsanan & Peria, 2024), aligning with the call for subject-specialist instructors and a clearly defined curriculum (Tirol, 2022)

Barrot (2023) critically analyzed the K to 12 curriculum's alignment with the Education 4.0 framework, highlighting the need for conceptual and pedagogical adjustments to better prepare learners for future challenges. Challenges include difficulties in achieving constructive alignment, integrating ICT, and incorporating key curricular elements, which may hinder effective instructional delivery, assessment, lesson planning, and the commitment of educators and school leaders.

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It was also observed that most studies on K to 12 science implementations were conducted before 2020 and focused on specific regions, limiting the generalizability of findings across diverse Philippine educational contexts. This gap highlights the need for updated research to reassess the current status of the science curriculum under the K to 12 framework across a broader geographical spectrum.

In practical curriculum implementation, various factors influence success. Rogayan and Villanueva (2019), citing the National Research Council of the National Academies Press (2004), categorize these factors into resource variables (availability of materials and facilities), process variables (methods and procedures of implementation), and contextual variables (social conditions, beliefs, and expectations of stakeholders). Understanding these dimensions is crucial for addressing challenges and ensuring that educational objectives are effectively met within the K to 12 reform.

Hence, this study assessed the status K to 12 science curriculum with regards to the categories on curriculum implementation component variables such as the resource variables, process variables and contextual variables. The study was primarily focused on the junior high school level of selected regions in the Philippines. Specifically, it aimed to answer the following research questions:

1. What is the demographic profile of teachers and administrators in terms of:
   (i) Sex;
   (ii) Position;
   (iii) Highest Educational attainment;
   (iv) Years of service as Administrator or Teacher;
   (v) Region where school is located;
   (vi) School Size (small, medium or large); and
   (vii) School Classification (Public or Private)?
2. What is the status of the implementation of the Junior High School K to 12 Science Curriculum in terms of:
   (i) Resource Variables;
   (ii) Process Variables; and
   (iii) Contextual Variables?
3. Is there a significant difference in the perceived status of implementation when the responses are grouped according to demographic profile?

2. Methodology

2.1 Research Design

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The study employed the descriptive-survey research design that attempts to collect data from members of a population to determine the current status of that population concerning one or more variables (Mugenda and Mugenda, 2003).

The study explores participants' perceptions regarding the implementation status of the Junior High School K to 12 Science Curriculum, focusing on three key dimensions: Resources, Processes, and Contextual Variables.

2.2 Respondents and Location

The respondents of this study comprised 16 school heads and 144 science teachers from public and private secondary schools across Regions I, III, and V. This diverse group was chosen to provide a comprehensive understanding of the perspectives and experiences related to the implementation of the K to 12 Science Curriculum.

2.3 Research Instruments

The structured questionnaire served as the main instrument in gathering the data. It is composed of two (2) parts. The first part consists of the demographic profile of the respondents. The second part includes three variables: resource variables (12 items), process variables (10 items) and contextual variables (10 items). The questionnaire was adapted from the study of Rogayan and Villanueva (2019) who described the implementation status of K to 12 Social Studies Program in Philippine Public High Schools. The questionnaire was edited to conform to capturing the perception of the respondents in status of junior high school K to 12 Science curriculum.

The questionnaire was subjected to validity and reliability tests before implementation. To assess the validity of the questionnaire, a rating scale for 10 indicators was employed, with 5 representing the highest level of validity and 1 indicating the lowest. To ensure a rigorous assessment, three experts—each holding a PhD in Science Education or a Master's degree in Science Education alongside an EdD—were invited to evaluate the questionnaire. The ratings from these independent raters are summarized in Table 1.

The validation ratings of the 3 experts yielded a Kendall's W value of 0.652, indicating a strong level of agreement among the raters (Moslem, Ghorbanzadeh, Blaschke & Duleba, 2019). The strong W-value suggests that the raters ranked the indicators similarly, demonstrating a reliable evaluation process during the validation phase.

Table 1 Summary of ratings from three independent raters

Indicators	Ratings			
	E1	E2	E3	Mean

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Qualification of constructs in the study (with 8 sub-indicators)	4.13	5.00	4.75	4.62
Clarity	4.00	5.00	5.00	4.67
Wordiness	5.00	5.00	5.00	5.00
Balance	4.00	5.00	5.00	4.67
Overlapping Responses	4.00	5.00	5.00	4.67
Use of Jargon	5.00	5.00	5.00	5.00
Appropriateness of response listed	4.00	5.00	4.00	4.33
Use of technical language	4.00	5.00	4.00	4.33
Application to praxis	4.00	5.00	5.00	4.67
Relationship to problem	4.00	5.00	5.00	4.67
Overall Mean				**4.66**

Note: *E1: Evaluator 1, E2: Evaluator 2, E3: Evaluator3*

In addition to numerical ratings, the evaluators provided suggestions to improve the questionnaire further, which were completely applied by the researchers.

A pilot test of the survey questionnaire was conducted with 12 respondents of comparable qualifications who were not part of the main study. Their responses were analysed to assess the instrument's reliability, yielding a high Cronbach's alpha coefficient of 0.95, indicating excellent internal consistency.

2.4 Data Gathering Procedure

Phase 1. Securing Permission and Approval

Letters requesting authorization were sent to school administrators at the selected secondary public schools. These letters specifically seek approval for the distribution and collection of survey questionnaires directed at School Heads and Science Teachers.

Phase 2. Distribution and Collection of Questionnaires

The researchers administered the survey questionnaires to public and private junior high schools in Regions I, III, and V of the Philippines, selecting schools that were approached by the researchers and expressed interest in participating. Science teachers and Science Heads were invited to participate, as the survey was designed to assess their perceptions regarding the status of implementation of the science curriculum. The questionnaires, along with a Letter of Consent, were distributed through Google Forms, facilitating efficient data collection and management.

3. Results and Discussion

3.1 Profile of the Respondents

The demographic data (See Table 2) provides valuable insights into the profile of the respondents. It can be deemed from the profile that there is a skewed gender distribution, overwhelming presence of classroom educators, a well-educated

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respondent pool, relatively younger workforce, smaller representations from Region I and Region V, significant portion of respondents work in very large schools, overwhelming majority of respondents are from public schools. This information presents significant limitations in the generalizability of the findings.

Table 2 Profile of the Respondents

Demographic Variable	Frequency	Percentage
Sex at birth (N=160)		
Female	116	*72.5%*
Male	44	*27.5%*
Position (N =160)		
School Head	16	*10.0%*
Science Teacher	144	*90.0%*
Highest Educational Attainment (N =160)		
Bachelor's Degree	36	*22.5%*
Bachelor's Degree with MA/MS units	73	*45.6%*
Master's Degree	30	*18.8%*
Master's Degree with PhD/EdD units	11	*6.8%*
Doctoral Degree	10	*6.3%*
Years of Service as School Head or Teacher (N =160)		
1 – 5 years	51	*31.9%*
6 – 10 years	44	*27.5%*
11 – 15 years	28	*17.5%*
16 – 20 years	16	*10.0%*
More than 20 years	21	*13.1%*
Region (N =160)		
Region I	40	*25.0%*
Region III	111	*69.4%*
Region V	9	*5.6%*
School Size (N =160)		
Small (399 students and below)	15	*9.3%*
Medium (400 to 750 students)	32	*20.0%*
Large (751 to 1,250 students)	46	*28.8%*
Very Large (1,251 students and above)	67	*41.9%*
School Classification (N =160)		
Private	35	*22.0%*
Public	125	*78.0%*

3.2 Status of Implementation of the K to 12 Science Program

3.2.1. Resource Variables

The assessment of K to 12 Science curriculum resources reveals strong support for effective implementation (See Table 3). Respondents highly agree that *science teachers are specialists (Rank 1)*, *supported by an adequate number of teachers (Rank 2)*, enabling

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quality instruction. This aligns with Darling-Hammond, Hyler, and Gardner (2017), who highlight that sufficient staffing and professional development improve teacher effectiveness and student outcomes by ensuring manageable workloads and strong support.

Table 3 Respondents' assessment of the K to 12 Science curriculum in terms of Resource Variables (N=160)

Resource Variables	Mean	SD	Interpretation	Rank
Adequate Number of Teachers	4.06	1.11	Agree	2
Specialist Teachers	4.25	1.06	Strongly Agree	1
Sufficient Instructional Time	3.31	1.15	Neutral	11
Ideal Class Size	3.63	1.22	Agree	4
Preparation Time	3.33	1.15	Neutral	10
Availability of Print Materials	3.26	1.26	Neutral	12
Availability of Non-Print Materials	3.59	1.05	Agree	6
Availability of Laboratory Equipment	3.55	1.15	Agree	7
Assessment Availability	3.94	0.91	Agree	3
Professional Development Opportunities	3.60	1.09	Agree	5
Access to Support Services	3.52	1.02	Agree	8
Parental Involvement	3.35	1.17	Neutral	9

Legend: *4.20 - 5.00 Strongly Agree; 3.40 - 4.19 Agree; 2.60 - 3.39 Neutral; 1.80 - 2.59 Disagree; 1.00 - 1.79 Strongly Disagree*

Participants rated the *availability of assessments high (Rank 3)*, emphasizing their role in monitoring student progress. *Ideal class sizes were also valued (Rank 4)*, as smaller classes allow for more personalized teaching and better use of instructional materials and lab equipment, which enhances student engagement-echoing Schanzenbach's (2014) findings on the benefits of smaller classes, especially for disadvantaged students.

However, *preparation time (Rank 10)* and *instructional time (Rank 11)* received low ratings, indicating challenges for effective teaching. Adequate preparation and planning time are essential for leveraging teacher expertise and materials, while sufficient instructional time ensures lessons are delivered thoroughly, as supported by Mertens et al. (2010) and Freundl and Wedel (2022).

Print materials for science classes were rated lowest (Rank 12). This is a persistent issue, though the increased availability of non-print resources-especially during the pandemic-has helped mitigate this challenge (Macias et al., 2022).

Overall, the assessment reveals strengths in areas such as teacher specialization and adequate staffing while highlighting concerns regarding preparation time, instructional time and print material availability.

3.2.2. Process Variables

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Data on process variables show key factors influencing science education effectiveness (See Table 4). *High adherence to curriculum standards (Rank 1)* reflects teachers' strong awareness and commitment to these standards, essential for achieving educational goals. This aligns with Altun's (2017) findings that teacher commitment motivates educators to invest more effort, fostering a positive school environment and enhancing student learning.

Table 4 Respondents' assessment of the K to 12 Science curriculum in terms of Process Variables (N=160)

Process Variables	Mean	SD	Interpretation	Rank
Teacher Organization	3.60	1.06	Agree	10
Involvement in Decision-Making	3.71	1.08	Agree	7
Adherence to Curriculum Standards	4.44	0.68	Strongly Agree	1
Support for Struggling Students	3.84	0.98	Agree	5
Grade-Level Meetings	3.68	1.09	Agree	8
Performance Review Processes	4.14	0.86	Agree	2
Culture of Inquiry	3.96	0.91	Agree	4
Written Support Materials	3.62	1.01	Agree	9
Student Grouping by Learning Styles	3.81	0.92	Agree	6
Engagement with Worthwhile Tasks	4.08	0.85	Agree	3
Composite Mean	**3.89**	**0.73**	**Agree**	-

Legend: *4.20 - 5.00 Strongly Agree; 3.40 - 4.19 Agree; 2.60 - 3.39 Neutral; 1.80 - 2.59 Disagree; 1.00 - 1.79 Strongly Disagree*

The positive view of *Performance Review Processes (Rank 2)* highlights the value of using data to guide instruction. Regular reviews help teachers assess student progress and adjust teaching, supporting effective curriculum implementation. Hattie and Timperley (2007) emphasize that ongoing feedback is crucial for refining instruction and achieving educational goals.

High ratings for *Engagement with Worthwhile Tasks (Rank 3)* and a *Culture of Inquiry (Rank 4)* show a focus on active learning and critical thinking, essential for student interest and analytical skills (Santos, 2017; Hattie & Donoghue, 2016).

Lower ratings for *Involvement in Decision-Making (Rank 7)* and *Teacher Organization presence (Rank 10)* indicate limited teacher participation in curriculum decisions. Gordon, Taylor, and Oliva (2019), as cited by Irembere, (2019) stress that teachers are key to curriculum development and implementation, serving as advocates and contributors throughout the process.

THE QUEST ISSN 1908-3211 (Online) | ISSN 1908-322X (Print)
Journal of Multidisciplinary Research and Development
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Vol. 4 No. 1 (2025)
Received: 03-04/ Revised: 05-06/ Accepted:06-30-2025
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Overall, these connections suggest that while there are strong elements in place for implementing the science curriculum such as adherence to standards, data-driven practices, and engagement in worthwhile tasks, there remain areas needing attention, particularly in enhancing teacher involvement in decision-making processes and improving organizational support structures.

3.2.3. Contextual Variables

Data on contextual variables highlight parental involvement, curriculum support, and communication in schools (See Table 5). *Inclusivity of the curriculum scored highest (Rank 1)*, reflecting strong agreement that it effectively engages all students regardless of gender or ethnicity. This positive perception supports findings on the successful implementation of K to 12 in developing scientific skills and concepts among Grade 8 students in Metro Manila (Montebon, 2014, as cited by Tirol, 2022).

Table 5 Respondents' assessment of the K to 12 Science curriculum in terms of Contextual Variables (N=160)

Contextual Variables	Mean	SD	Interpretation	Rank
Communication with Parents	4.11	1.02	Agree	2
Application of Learning at Home (Independently)	3.76	0.96	Agree	9
Application of Learning at Home (With Parents)	3.57	1.06	Agree	10
Orientation for Parents	3.80	1.15	Agree	7.5
Homework Materials	3.87	0.91	Agree	5
Inclusivity of the Curriculum	4.17	0.81	Agree	1
Teacher Support for Curriculum	3.99	0.87	Agree	3
Parental Support for Curriculum	3.83	0.90	Agree	6
Student Support for Curriculum	3.91	0.83	Agree	4
Community Support for Curriculum	3.80	0.90	Agree	7.5
Composite Mean	**3.88**	**0.75**	**Agree**	-

Legend: *4.20 – 5.00 Strongly Agree; 3.40 – 4.19 Agree; 2.60 – 3.39 Neutral; 1.80 – 2.59 Disagree; 1.00 – 1.79 Strongly Disagree*

High agreement on *Communication with Parents (Rank 2)* shows parents feel well-informed about their children's progress, which supports stronger parental involvement and student learning. Epstein et al. (2019, as cited by Graham-Clay, 2024) highlight that clear communication improves teacher-parent interactions, awareness of student progress, and understanding of school policies.

THE QUEST ISSN 1908-3211 (Online) | ISSN 1908-322X (Print) Journal of Multidisciplinary Research and Development

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Teacher Support for Curriculum (Rank 3) is also strong, reflecting confidence in the curriculum's effectiveness and aligning with high adherence to standards. Altun (2017) notes that teacher commitment motivates greater effort and fosters a more effective learning environment.

Lower scores for *Application of Learning at Home Independently (Rank 9)* and with *Parents (Rank 10)* suggest limited parental involvement in home learning and room to improve students' independent learning skills.

3.3 Test of Significant Difference on the Perceived Status of Implementation of the K12 Science Program Across Demographic Factors

A Mann-Whitney U Test *(for two independent groups)* and Kruskal-Wallis Test *(for three or more independent groups)* was conducted to evaluate significant differences in respondents' assessments of the Junior High School Science Curriculum under the K to 12 program, focusing on three practical curriculum implementation factors *(resource variables, process variables, and contextual variables)* with demographic factors as the grouping variable (See Table 6).

Table 6 Test of Significant Difference on Respondents' Assessment of the Curriculum when grouped according to the Demographic Factors

Factors	Sex	Position	Highest Educational Attainment	Years of Service	Region	School Size	School Type
Resource Variables	.439	.053	*.201*	.099	.136	.110	.525
Process Variables	.828	.142	*.349*	.654	.277	*.042	.929
Contextual Variables	.559	.142	*.820*	*.727*	*.065*	***<.001*	*.981*

Note: *(a) * $p \leq 0.05$ and ** $p \leq 0.01$*

(b) Demographic Factors that utilized Mann-Whitney U Test (Sex, Position, and School Type)

(c) Demographic Factors that utilized Kruskal-Wallis Test (Highest Educational Attainment, Years of Service, Region, and School Size)

The results indicated no significant differences on respondents' assessment of the Science curriculum when grouped according to sex, position, highest educational attainment, years of service, region and school type. Altogether, these findings suggest that respondents' assessments of the curriculum are not significantly influenced by demographic differences across resource, process, and contextual factors.

The consistency in evaluations implies a shared understanding among respondents from mentioned demographic factors regarding the effectiveness of the

P-ISSN: 1908-322X and E-ISSN: 1908-3211
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curriculum. This reinforces the potential for collaborative curriculum development efforts and shared continuing professional development for science teachers and science heads.

A different statistical tone was observed in the differences in respondents' assessments of the curriculum based on school size. The results for resource variables indicated no significant differences among the groups. In contrast, the analysis of process variables revealed significant differences (p = .042). This indicates that school size does influence evaluations of process variables. The median score for small schools was notably lower at 3.00 compared to the higher median scores of 4.00 reported by both medium, large, and very large schools.

Post-hoc analysis using Dwass-Steel-Critchlow-Fligner (DSCF) pairwise comparisons for process variables identified that the most likely source of statistical significance lies between small and very large schools (W = 3.46, p = .069). Although this p-value does not fall below the conventional alpha level of .05, it is noteworthy as it is the smallest p-value among all comparisons conducted. This suggests a trend towards significance, indicating that there may be meaningful differences between these groups that warrant further investigation. The proximity of this p-value to .05 implies that with a larger sample size or slightly different conditions, these differences could potentially reach statistical significance.

For contextual variables, post-hoc analysis revealed significant differences between several groups: small vs. large (p = .042), large vs. very large (p = .031), and small vs. very large (p = .004). The significant findings highlight that as school size increases, perceptions regarding contextual variables improve significantly, particularly when comparing small schools to very large schools. This underscores the importance of considering school context when evaluating curriculum effectiveness and suggests targeted improvements may be necessary in smaller educational settings to enhance perceptions of both process and contextual factors within the curriculum.

4. Conclusion

Overall, the K to 12 Science curriculum in the Philippines shows a solid foundation characterized by teacher expertise and strong adherence to educational standards. However, to enhance its effectiveness, it is crucial to address limitations related to print resource availability, instructional time, parental involvement in learning at home, student independent learning, and teachers' involvement in curricular decisions.

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ISSN 1908-3211 (Online) | ISSN 1908-322X (Print)
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Vol. 4 No. 1 (2025)
Received: 03-04/ Revised: 05-06/ Accepted:06-30-2025
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P-ISSN: 1908-322X and E-ISSN: 1908-3211
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Received: 03-04/ Revised: 05-06/ Accepted:06-30-2025
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