

Science Program in Selected Public Elementary Schools: A Formative Evaluation

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Abstract

The implementation of the K to 12 curriculum in the Philippines started in 2012. While the program began with Grade 1 and Grade 7 students, the succeeding levels were introduced as these students get promoted to the next grade levels in the following school year. During the school year 2011-12, Republic Act 10157 or the Kindergarten Education Act was implemented. The Act institutionalized the inclusion of kindergarten education in the basic education system. Republic Act 10533, also known as the Enhanced Basic Education Act of 2013, enabled the implementation of the K to 12. This study aimed at conducting formative evaluation of the implementation of K to 12 Science Program of public elementary schools in Cabagan District, Cabagan, Isabela, Philippines for the first semester of school year, 2019-2020. The respondents of the study were teachers and administrators from twelve (12) randomly selected public elementary schools in Cabagan district. The study used quantitative and qualitative designs of research. Survey questionnaire and interview guide were used to gather data. This paper presents the teachers' competencies and pedagogical practices in teaching science. It also presents common problems encountered by teachers and administrators in the implementation of the program, and the degree of seriousness of these problems.

Keywords: K to 12 curriculum, Science program, formative evaluation, teachers' competencies, pedagogical approaches

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Introduction

Basic Education in the Philippines underwent radical change. In this current program on basic education, students spend twelve years, instead of the usual ten years. The implementation of the K to 12 program started in June 2012. First graders go through twelve years of basic education instead of ten years while high school freshmen spend six years rather than the usual four.

This two year addition is supposed to bring our students at par with international standards and synchronize the Philippine educational system to world standards. It will also stream students into the rational vocational college bound tracks that fill employment demands (Hall, 2012 in Bernardo et al., 2018). The program will prepare graduates for higher education and master the basics. Thus, it will prepare them better for work. Other implications of the K to 12 Program include the following: graduates will be better prepared for higher education; graduates will have a better mastery of basics, and remedial courses will no longer be necessary, graduates of the K to 12 Program will be better prepared for work, thus they can go directly to work. In view of the implementation of the K to 12 Program, a development of a National Qualifications Framework is deemed necessary (Licuanan, 2012). With the curricular changes for these two additional years, higher education institutions (HEIs) worry about the impact of all these will have.

When the first batch of high school students under the K to 12 curriculum graduated in March 2018, they are not only functionally literate but are also equipped with "21st century core skills" as termed by the Department of Education (DepEd) that is, digital age literacy, inventive thinking, effective communication and high productivity. These core skills, according to DepEd, would make them ready for both career (either employment or entrepreneurship) and for higher education (either in vocational-technical institutes or in colleges and universities) (Chua, 2012). Towards this goal is the quality and effective delivery of instruction.

The implementation of the program includes the development of a revised general education curriculum and shortening of a college curriculum. Teacher Education Institutions (TEIs) adjusted its pre-service programs to align with the needs of the education sector.

Administrators of HEIs were challenged on how to address the impact of this program to enrolment during its transition period in SY 2016-17 and SY 2017-18. But of high importance is the evaluation and re-engineering of the higher education curricular program to address the changes.

Evaluation of a new program is an essential activity so as to draw feedback for its improvement.

This study aimed at conducting formative evaluation of the implementation of K to 12 Science Program of public elementary schools in Cabagan District, Cabagan, Isabela, Philippines for the first semester of school year, 2019-2020.

Specifically, the research aimed to:

1. Determine the teachers' competencies and pedagogical practices in teaching science.
2. Determine the common problems encountered by teachers and administrators in the implementation of the program, and the degree of seriousness of these problems.

Methodology

The study used quantitative and qualitative designs of research. Survey questionnaire and interview guide were used to gather data. The study focused in selected public elementary schools in Cabagan, Isabela, Philippines. Stratified random sampling of schools was done. The respondents of the study were teachers and administrators from twelve (12) randomly selected public elementary schools in Cabagan district.

1. Sources of Data

This study was conducted in twelve public elementary schools in the district of Cabagan in Isabela, Philippines. Schools were randomly selected. Science teachers from the randomly selected schools were part of the respondents. All science teachers from the 12 elementary schools were included in the study. There were 59 respondents in the study.

2. Research Instruments

The survey questionnaire developed by Daguio (2018) for elementary teachers was used in this study. The survey questionnaire for teachers included statements on the extent of implementation of the Science program and on the problems and difficulties encountered by the teachers in the implementation of the program.

An interview guide was used during the interview to validate data from the questionnaire answered by the respondents.

3. Data Gathering Procedure

The data of the study were gathered by means of a survey and interview of stakeholders.

4. Data Analysis

Descriptive statistics were used for the quantitative analysis. Mean was used to measure the extent of implementation and in describing the degree of seriousness of problems encountered. The following intervals were used in interpreting the computed weighted mean for the extent of implementation of Science program:

Table 1. *Arbitrary scale used to describe the extent of implementation of science program*

Weight	Scale/Range	Description	Code
5	4.50 – 5.0	Very Great Extent	VGE
4	3.50 – 4.49	Great Extent	GE
3	2.50 – 3.49	Moderate Extent	ME
2	1.50 – 2.49	Little Extent	LE
1	1.00 – 1.49	Very Little Extent	VLE

To describe the level of seriousness of problems, the following intervals were used:

Table 2. *Arbitrary Scale on Describing the Degree of Seriousness of Problems Encountered*

Weight	Scale/Range	Description	Code
5	4.50 – 5.0	Very Serious	VS
4	3.50 – 4.49	Serious	S
3	2.50 – 3.49	Moderately Serious	MS
2	1.50 – 2.49	Slightly Serious	SS
1	1.00 – 1.49	Not a problem	NP

Results and Discussion

Teachers' Competencies and Pedagogical Practices in Teaching Science

Competencies and the pedagogical practices which are implemented by the teachers are shown in Table 3.

Based on Table 3, it appears that the pedagogical practices listed above are implemented to a great extent (GE). The pedagogical practices which are implemented by most of the teacher respondents include the following: allowing students to speak freely or create a class environment which is comfortable to students, communicating at the level of the pupils/students, and providing clear explanations about the topic. Other practices are making connections to what students already know and the use of the 5E Learning Model.

Table 3. *Competencies and Pedagogical Practices in Teaching Science*

IMPLEMENTATION	RESPONDENTS				OVER-ALL MEAN RATING	DESCRIPTION
	TEACHERS					
	G3	G4	G5	G6		
1. Makes connections to what students already know	4.24	4.37	4.267	4.36	4.31	GE
2. Provides clear explanations about the topic	4.35	4.42	4.47	4.21	4.36	GE
3. Use pupils' schema to:						
3.1. deepen knowledge	4.24	4.37	4.07	3.79	4.12	GE
3.2. encourage participation	4.24	4.42	4.07	4.21	4.24	GE
3.3. encourage understanding	4.24	4.42	4.27	4.29	4.31	GE
4. Patterns instruction in the 5E Learning Cycle Model						
4.1. Engagement	4.24	4.32	3.93	4.36	4.21	GE
4.2. Exploration	4.12	4.11	4.00	4.29	4.13	GE

4.3.	Explanation	4.06	4.32	4.13	4.36	4.22	GE
4.4.	Elaboration	4.12	4.26	4.00	4.429	4.20	GE
4.5.	Evaluation	4.18	4.26	4.13	4.36	4.23	GE
5.	Tackles competencies with the intended breadth and depth as articulated in the grade level standards	4.06	3.95	3.87	3.57	3.86	GE
6.	Uses various teaching approaches in Science :						
6.1.	Multi-Disciplinary Approach	3.53	3.63	3.87	4.00	3.76	GE
6.2.	Inquiry-Based Approach	3.94	4.05	4.00	3.71	3.93	GE
6.3.	Problem-Based Approach	3.71	3.95	3.80	3.93	3.85	GE
6.4.	Contextual Learning	3.94	4.05	3.93	3.93	3.96	GE
6.5.	Constructivist Approach	3.82	3.90	3.67	3.79	3.80	GE
6.6.	Guided Inquiry-Based Approach	4.00	3.90	4.00	4.00	3.98	GE
7.	Employs contextualization in teaching the subject	3.82	4.11	3.73	3.79	3.86	GE
8.	Uses hands-on learning activities	3.94	4.26	3.80	3.93	3.98	GE
9.	Uses evidence in constructing explanation	4.06	4.11	4.13	4.21	4.13	GE
10.	Provides concrete, real life and practical examples	4.24	4.26	4.07	4.29	4.22	GE
11.	Develops instructional materials incorporating coherent learning activities and experiences	4.12	4.21	4.20	4.36	4.22	GE
12.	Allows students to speak freely or create a class environment which is comfortable to students	4.35	4.63	4.33	4.21	4.38	GE
13.	Communicates at the level of the pupils/students	4.35	4.47	4.40	4.29	4.38	GE

14. Guides students by asking questions that will lead them to develop their own ideas on the topic	4.47	4.37	3.93	4.36	4.28	GE
15. Provides varied activities to develop multiple intelligences	4.12	4.37	3.87	4.07	4.11	GE
16. Integrates Science lessons in other subjects	4.18	4.32	4.07	4.00	4.14	GE
GRAND MEAN RATING					4.06	GE

Common problems encountered in the implementation of the Science program

The common problems encountered by teachers in the implementation of the Science program and the degree of seriousness of these problems are discussed below in terms of the following areas: Teacher Preparation and Preparedness, Learner Preparation/Readiness, Teaching Strategies and Techniques and Learning Resources and Facilities.

Table 4. *Problems encountered in terms of Teacher Preparation and Preparedness*

PROBLEMS	RESPONDENTS				OVER-ALL MEAN RATING	RANK	DESCRIPTION
	TEACHERS						
	G3	G4	G5	G6			
1. Inadequate seminars/trainings related to K+12 Science Program.	3.2 4	3.6 3	3.2 0	3.3 6	3.36	1	S
2. Insufficient readings and study materials in Science	3.0 0	3.1 6	3.6 7	3.2 1	3.26	.2	MS
3. Lack of knowledge, skills, attitudes, values pertinent to K + 12	2.6 5	2.7 4	2.6 0	2.7 9	2.70	3	MS
4. Poor awareness on the goals, purposes, and objectives of K+12 Science Program	2.5 9	2.5 8	2.5 3	2.2 9	2.50	7	MS
5. Lack of confidence to apply appropriately	2.4 7	2.5 8	2.7 3	2.2 1	2.50	7	MS

6.	Insufficient knowhow on how to address the needs of learners	2.53	2.58	3.00	2.36	2.62	4	MS
7.	Lacks mastery on teaching content and objectives	2.35	2.74	2.40	2.50	2.50	7	MS
8.	Inadequate knowledge on varied teaching strategies and techniques	2.35	2.68	2.73	2.14	2.48	9	SS
9.	Insufficient knowledge on educational technology	2.59	2.74	2.47	2.50	2.56	5	MS
10.	Inadequate know-how on the use of varied assessment tools.	2.41	2.47	2.33	2.50	2.43	10	SS
GRAND MEAN RATING						2.69		MS

Table 4 shows that among the items under the area of Teacher Readiness and Preparedness, problem on Inadequate K to 12 Seminars/Training ranked first with mean rating of 3.36. This suggests that teachers and administrators met serious problems on the inadequacy of teacher trainings on K to 12.

A grand mean rating of 2.69 means that the problems on Teacher Readiness and Preparedness are moderately serious.

Table 5. *Problems encountered in terms of Learner Preparation and Preparedness*

PROBLEMS	RESPONDENTS				OVER-ALL MEAN RATING	RANK	DESCRIPTION
	TEACHERS						
	G3	G4	G5	G6			
1. Poor awareness on the goals, purposes and objectives of the K+12 Science curriculum	2.59	2.84	2.67	2.29	2.60	5.5	MS
2. Lacks orientation, symposium to broaden the knowledge in K+12	2.94	3.11	2.73	2.93	2.93	2	MS

3. Lacks knowledge on the rationale why the enhanced basic education curriculum is implemented	2.7 6	3.0 0	2.6 7	2.6 4	2.77	4	MS
4. Lack of understanding on concepts and class activities	2.5 9	2.6 8	2.4 7	2.3 6	2.53	8	MS
5. Relating personal experiences for the long retention of learning are not observed	2.5 9	2.6 8	2.6 7	2.4 3	2.60	5.5	MS
6. Various materials needed for instruction are meager	2.7 6	3.1 6	3.2 0	3.2 1	3.08	1	MS
7. Shows passivity in class discussions and making projects	2.8 8	2.9 4	2.8 0	2.7 9	2.85	3	MS
8. Performance assessment tools are not clearly explained	2.5 3	2.7 4	2.7 3	2.2 9	2.57	7	MS
9. Lack of knowledge and poor understanding on underlying concepts and principles that can be applied to problems/situations in new contexts	2.3 5	2.6 8	2.6 0	2.1 4	2.44	9	SS
10. No orientation about the new ways on how the lessons are presented	2.4 7	2.5 8	2.2 0	2.4 3	2.42	10	SS
GRAND MEAN RATING					2.68		MS

The problem on meager materials needed for instruction is ranked first and is described as moderately serious. Problems encountered in terms of learner preparation and preparedness have grand mean of 2.68 and are considered moderately serious problems.

Table 6. *Problems encountered in terms of Teaching Strategies and Techniques*

PROBLEMS	RESPONDENTS				OVER-ALL MEAN RATING	RANK	DESCRIPTION
	TEACHERS						
	Gr 3	Gr 4	Gr 5	Gr 6			
1. Team teaching to bring about effective teaching is not done	2.5 9	2.7 9	2.6 7	3.2 9	2.84	5	MS
2. Various assessment tools to rate students' performance are not used	2.5 9	2.6 8	2.6 7	2.5 7	2.63	9	MS
3. Lack of appropriate technology-assisted instruction	2.7 1	3.0 5	3.0 0	3.1 4	2.98	3	MS
4. Insufficiency of varied teaching strategies and techniques	2.4 7	2.7 9	2.6 7	2.9 3	2.72	7	MS
5. Limited incorporation of students practical experiences with the lessons	2.8 9	3.0 5	2.9 3	3.2 9	3.04	2	MS
6. Resources of the community are meager for student exposure	2.8 8	3.1 1	3.3 3	3.2 9	3.15	1	MS
7. Inadequate knowledge in contextualization (localization and indigenization of instructional materials)	2.7 1	2.7 4	2.6 0	3.0 0	2.76	6	MS
8. Groupings in accomplishing projects are not employed	2.2 4	2.4 7	2.8 0	3.0 7	2.65	8	MS
9. Difficulty improvising instructional materials in Science	2.4 7	2.8 4	2.8 0	3.2 9	2.85	4	MS
10. Monotonous use of teaching	2.5 3	2.5 8	2.4 0	2.7 9	2.56	10	MS

strategy and approaches		
GRAND MEAN RATING	2.82	MS

The problems encountered by teachers in terms of Teaching Strategies and Techniques have a grand mean rating of 2.82 which means these are moderately serious problems. Meager resources of the community for student exposure is ranked first (over-all mean rating = 3.15) and limited incorporation of students' practical experiences with the lessons ranked second (over-all mean rating = 2.00).

Table 7. *Problems encountered in terms of Learning Resources and Facilities*

PROBLEMS	RESPONDENTS				OVER-ALL MEAN RATING	RANK	DESCRIPTION
	TEACHERS						
	G3	G4	G5	G6			
1. Insufficient computers in school to be used in teaching	3.47	3.68	3.40	3.79	3.59	3	S
2. No available projector and ICT related materials needed in teaching-learning process.	3.24	3.37	3.20	4.00	3.45	6	MS
3. No available learner's materials in the subjects	2.65	2.68	3.00	3.29	2.91	9	MS
4. Lack of textbooks needed in the lesson	2.41	2.84	2.93	3.50	2.92	8	MS
5. Inadequate community resources as an aid of student learning	3.12	3.37	3.46	3.86	3.45	6	MS
6. Few reference materials are found in the school library	2.94	3.63	3.07	4.14	3.45	6	MS
7. No available laboratory rooms and laboratory equipment needed in	3.65	3.79	4.06	4.29	3.95	1	S

laboratory activities or experiments								
8. Limited numbers of books and references are found in the community	3.2	3.4		4.0				
	4	2	3.20	0	3.47	4		MS
9. Few available materials for projects and research work	3.3	3.4		4.3				
	5	7	3.60	6	3.70	2		S
10. No available Teacher's guide in the subject	2.3	2.6		2.7				
	5	3	2.80	9	2.64	10		MS
GRAND MEAN RATING					3.35			MS

Problems encountered by teachers in terms of Learning Resources and Facilities have a grand mean of 3.35 which is described as moderately serious. Among the problems on Learning Resources and Facilities, no available laboratory rooms and laboratory equipment needed in laboratory activities or experiments is ranked first. The over-all mean rating = 3.95 which is considered serious. Few available materials for projects and research work is ranked 2 with an over-all mean rating of 3.70 which is another serious problem. Insufficient computers in school to be used in teaching is ranked third with an over-all mean rating of 3.59. The other seven problems are considered moderately serious problems.

Table 8. *Problems encountered in terms of Curriculum Enhancement*

PROBLEMS	RESPONDENTS				OVER-ALL MEAN RATING	RANK	DESCRIPTION
	TEACHERS						
	G3	G4	G5	G6			
1. Mandated by authorities with predetermined content	2.94	2.89	3.07	2.57	2.87	1	MS
2. No participation of teachers concerned in the formulation of the curriculum	2.53	2.74	2.53	2.79	2.65	7	MS
3. Integration of the resources and needs of the community is not evident	2.76	2.89	2.73	3.07	2.86	2	MS

4. Integration of the needs and interest of the learners is not been considered	2.59	2.79	2.40	2.43	2.55	9	MS
5. Revision as needed to make content relevant has not given attention	2.71	2.74	2.73	2.71	2.72	4	MS
6. Project-based learning activities have not carefully planned	2.76	2.84	2.60	2.50	2.68	5.5	MS
7. Very few learning situations that develop critical thinking and problem solving skills	2.65	2.84	2.73	2.79	2.75	3	MS
8. Content is not simplified to the level of student	2.59	2.79	2.67	2.43	2.62	8	SS
9. Teacher lacks knowledge on how to enhance subject matter	2.29	2.47	2.27	2.07	2.28	10	SS
10. Activities that develop student communication skills are not enough	2.59	2.68	2.80	2.64	2.68	5.5	MS
GRAND MEAN RATING					2.67		MS

Problems encountered by the teachers in terms of Curriculum Enhancement have a grand mean rating of 2.67 which is described as moderately serious. Mandated by authorities with predetermined content is ranked 1 (Over all mean rating = 2.87), Integration of the resources and needs of the community is not evident is ranked 2 (Over-all mean rating = 2.86) and Very few learning situations that develop critical thinking and problem solving skills is rank no. 3.

The common problems encountered by teachers in the implementation of the Science program in terms of the following areas: Teacher Preparation and Preparedness, Learner Preparation/Readiness, Teaching Strategies and Techniques and Learning Resources and Facilities are moderately serious problems.

Conclusions and Recommendations

The K to 12 curriculum started in 2012 to cope with globalization. It is one of the biggest educational reforms in the Philippine educational system. As a new program, evaluation is vital to strengthen or improve the program and to monitor the progress made in its implementation. This is important in decision-making.

The implementation of Science program in the district of Cabagan, Isabela in terms of curriculum guide, competencies and pedagogical practices, desired outcomes, medium of instruction, time allotment, learning resources, and assessment, are implemented by the teachers to a great extent.

However, there are still serious problems that should be resolved immediately so that the objectives of program are attained. Teachers still lack trainings related to the K to 12 science program and learning materials are still insufficient to satisfy the demands of the program.

While the Department of Education (DepEd) of the Philippines, the administrators and the teachers and have made some major moves, more are still to be done so that the program be successfully implemented.

There is a dire need to look into as soon as possible on problems that teachers are facing specifically on the lack of trainings and learning materials and resources. These are the defining factors towards the successful implementation of the program.

It is therefore recommended that the Department of Education shall provide more seminars/training for teachers so they will be properly equipped with adequate knowledge and skills to effectively implement the curriculum. The Department should provide sufficient learning materials in Science to cater to the needs of the learners. DepEd shall conduct additional trainings and seminars on contextualization and localization to assist teachers in developing materials and strategies to enhance learning. Parallel research studies should be conducted to determine the extent of the implementation of Basic Education Program in other courses such as mathematics, english, social studies and in the secondary level. More intensive orientation should be done to increase the knowledge and understanding of students on the underlying concepts and principles that can be applied to problems/situations in new the contexts. Teachers and administrators shall strengthen community linkages and seek more educational partners that can be of help to minimize the effects of inadequacy of budget. Results of this study may be disseminated to the respondent schools for teachers and administrators to be informed on the extent of their implementation of the program and the problems encountered. By knowing the results, problems may be given immediate solutions.

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