Journal of World Englishes and Educational Practices (JWEEP)
ISSN: 2707-7586
Website: www.jweep.org

Original Research Article

The Readiness of Mathematics Teachers in Teaching K-12: The Spiral Approach

Fe R. Janiola
Mathematics and Natural Sciences Department, Holy Name University, Tagbilaran City, Bohol, Philippines
Corresponding Author: Fe R. Janiola, E-mail: fjaniola@gmail.com

ARTICLE INFO

Article History
Received: May 21, 2020
Accepted: June 25, 2020
Volume: 2
Issue: 2

KEYWORDS

Assessment,Readiness, Perception,Spiral Approach, Math Teachers

ABSTRACT

This study assessed the teachers' perceptions regarding their readiness to teach Mathematics using the Spiral Progression Approach. The respondents were the tertiary teachers handling Mathematics subjects. In the research process, the researcher utilized a modified questionnaire. The data collected using questionnaires to all college faculty who taught math subjects. The data gathered were statistically treated, analyzed, and interpreted using the Chi-square Test of Independence. The study revealed that the teachers want more growth and development on Probability and Statistics and Geometry. The teachers were ready but a need few improvements in the overall readiness of using the Spiral Progression approach in terms of goals, content, tools, skills, and processes and theories and principles. The teachers' perception was undecided towards attaining the goals of a spiral approach in teaching Mathematics. Teachers need for Professional Development in Pedagogical Content Knowledge and Classroom-based Assessment. There is no significant relationship between the teacher's perception and the level of readiness in teaching the Spiral Progression Approach in the k-12 curriculum. The study implies that though the teachers were ready in the overall readiness and familiar with the Spiral Approach they have difficulty with the use of the spiral approach in teaching math. The result of the study served as the basis for conducting the In-service training.

Introduction

Upon assessing their readiness level and perceptions towards using the Spiral Approach in teaching mathematics, the school find it necessary to upgrade and sustain teacher capacities through continuous professional development. This study will benefit mathematics teachers, education policy makers, curriculum planners, educational administrators, and schools which needed to retool their teachers for a more effective implementation of the K to 12 program.

Literature Review

The attainment of the national goals of quality basic education depends heavily on the quality of teachers produced by these Teaching Education Institutions (TEIs). Moreover, the mandate of TEIs may not be limited to pre-service teacher preparation. In-service teacher training and the continuous professional development of teachers currently on the job is also equally important concern particularly in the light of the recent K to 12 Basic Education reform. This study on the readiness of mathematics teachers is an essential preliminary step towards a research-based curriculum development program for continuing professional development of in-service teachers. By measuring the perception of those who are proving instruction it is hoped that the data collected and the interventions identified will provide administrators with valuable information when researching and developing a professional development program for their teachers.

Teachers and teacher education play a vital role in the success of the implementation of curriculum reforms. Before conducting the retooling and empowering process of teachers as a key component in the success of implementation in all aspects of curriculum reform, there is a need to assess their readiness level their perception towards the use of a spiral

progression approach in teaching k-12. Given that it is largely the responsibility of the teacher to manage the teaching-learning environment to attain the desired outcomes of education, schools find it necessary to identify the specific areas of content needs for professional development to sustain teacher capacities through continuous professional development. This study will inform TEIs the teacher's level of readiness in using the Spiral approach in teaching math and the kind of professional development programs that teachers truly need.

The K to 12 Basic Education Program is a major education reform implemented in 2012 in the Philippines. It serves as a response to the urgent need to improve the quality of Philippine basic education. The K-12 program aims at decongesting and enhancing the basic competencies, lengthening the cycle of basic education to cover kindergarten through year 12' (SEAMO INNOTECH, 2012:1). The K to 12 Basic Education Curriculum for Mathematics. The *K to 12* Basic Education program has been enacted into law as Republic Act 10533 of the Philippines otherwise known as the "Enhanced Basic Education Act of 2013. This reform does not only add two years to basic education and reiterates universal kindergarten, but also prescribes the standards and guidelines the Department of Education (DepEd) must follow in developing the curriculum. Some salient features of this reformed curriculum which has a great impact in the teaching of mathematics include the use the *spiral progression approach* to ensure mastery of knowledge and skills after each level and pedagogical approaches that are constructivist, inquiry-based, reflective, collaborative and integrative (Section 5, Republic Act 10533, 2013).

The Spiral Progression Approach inspired by Bruner's model of the spiral curriculum. Tan (2012) stated that students continually return to basic ideas as new subjects and concepts are added over the course curriculum. This is done to solidify understanding over periodic intends for students to learn, rather than simply memorizing equations to pass a test.
Teachers and teacher education play a vital role in the success of the implementation of curriculum reforms. Because of this situation, before conducting a series of training there is a need to evaluate the readiness of teachers in teaching the spiral progression approach using the *Goal-Based Evaluation Model*. This Evaluation will measure whether the predetermined target has been met. Goal-based Evaluation is either formative or summative.

The formative evaluation takes place in the lead up to the program, to clarify the need for the program. Summative evaluation is the outcome, to assess whether the program has met its goals, whether there were any unintended consequences, what were the learning's and how to improve (Owen & Rogers, 1999). A goal-based Evaluation is any type of evaluation based on and knowledge of the goals and objectives of the program (Scriven,1991, p178).

One of the new features of the K-12 Basic Education Curriculum is the Spiral Progression Approach in teaching in Mathematics. Ulep (2014) emphasized that the goals of Mathematics in the k-12 are critical thinking and problem-solving skills. To achieve these goals, there is a need to check the readiness of and perception level of teachers towards the content, skills, and process, and the tools used in teaching. Furthermore Tan (2014) describes the importance of the Spiral Progression approach to solidify understanding over periodic intervals of students to learn, rather than memorizing equations to pass a test so that students continually return to basic ideas as new subjects and concepts added throughout a curriculum. Since the school year, 2016-2017 was the start of the first batch of grade 11 senior high school and the starting point of the transition period of no freshmen college student, some college faculty transferred to senior high school.

Objectives of the Study

This study aims to gather the teacher's readiness and perception on the use of the spiral approach in teaching Math.
Specifically, this will attempt to answer the following questions:
1. What is the Teacher's Level of Readiness in terms of:
1.1 Content Knowledge
2. What are the teacher's levels of readiness on the Spiral Approach in Teaching Math
3. What are the teacher's perceptions of the Spiral Approach in Teaching?
4. Is there a significant relationship between the teachers' perception and the level of readiness towards the use of a spiral approach?

Methodology

A quantitative research survey design to determine if there was any significant relationship between the readiness level and perception towards teaching mathematics using the Spiral Approach. The study was conducted at Holy Name University, Tagbilaran City, Bohol. This University offers Senior high school of the k-12 program.

The study utilized a modified questionnaire of Prince and Felder (2006) and further modified by (Reston, E.D. & Cañizares, M.J.F,2016). All the 10-college faculty who taught mathematics subjects in the school year 2015-2016 were the respondents of the study. The questionnaires were pilot tested using a sample of secondary math teachers of the same university. The results of the pilot testing showed the Cronbach alpha values of 0.854. The researcher first sends a letter to the dean of the College of Arts and Sciences of HNU requesting permission to conduct the study. The data gathered were statistically treated, analyzed, and interpreted using the Chi-square Test of Independence. Using numerical summary measures and frequency and percentage distribution tables were to organize quantitative data from the survey.

Results and Discussion

This section presents the data of Educational and Professional of the respondent, Teachers Readiness Level, and Perception towards the Spiral Approach. The profile of teachers for this school year, there were (40%) pure math faculties in the entire Department, (60%) of the science faculty taught mathematics subjects. All faculties acquired a master's degree, (40%) with a Doctoral degree, and (40%) were pursuing their doctorate. Twenty percentage of faculty taught the department less than ten years, (30%) of the faculty taught eleven to twenty years, (10%) faculty taught twenty-one to thirty years and (20%) faculty taught more than thirty years in the said institution. The Certificate Programs they Completed were (70%) finished the Certificate in Professional Education and (10%) in the Certificate Program in Physics. They attended some Professional Training like two faculties attended the assessment seminar, (30%) underwent the Math Content Specialization training, two joined on Spiral Progression seminar, and (40%) attended the Teaching Strategies seminar and only one was able to attend the ICT/ Educational Technology seminar.

The teachers expressed that the areas of content that needs for Professional Development under the Pedagogical Content Knowledge were 34% for the Constructivist teaching such as experiential, inductive, reflective and integrative, 34% for Teaching critical thinking and problem solving within math content, 22 % for integrating technology for effective math learning and 11% for the Spiral Approach. Seventy-five percent need professional development in rubric construction while 14% for test construction and formative assessments. The kind of professional development needed to equipped by the teachers for better in teaching secondary *K to 12* mathematics were 63% wanted to have Action Research/Lesson Study Approach/Community of Practice, 25% expressed to enroll a 24-unit Certificate Program in Teaching Mathematics (both content and pedagogy); may be finished in two summer terms, and 12% just wanted to have Short 1 to 2-week workshops on Math content and pedagogy.

Teacher's level of Readiness of Content Knowledge: The learning domains/areas in the K to 12 mathematics curriculum according to the perceived level of readiness of sharing the knowledge mastery and confidence in a spiral approach in teaching the area**.** The teachers thought they are most knowledgeable and confident to teach on Number and Number Sense, measurement, and Algebra and Pattern respectively. The teacher felt a need for further training on Probability and Statistics and Geometry.

The teachers were ready in the technological tools used in Teaching Spiral Progression Approach. The teacher was ready in using the strategies in the classroom that combine content, technologies, and teaching approaches learned in seminars, workshops, conferences, and related activities with a mean of (4.0). They were ready to use manipulative objects, highly ready to used calculators, sometimes computers in teaching.

Teacher's Readiness Level on the Spiral progression Approach in Teaching Math The overall readiness of teaching using the Spiral Progression Approach. The researcher found out that the teacher was ready in the teaching using the Spiral Approach specifically in learning principles and theories, and moderately ready in the Content and skills and usually apply the different classroom strategies. The teachers were also ready in the assessment of the learning of students in terms of knowledge, processes, understanding, and product.

Teacher's Perception towards the Spiral Progression Approach in Teaching Math. The teachers were in the undecided level on the overall perception towards teaching using the Spiral Approach with a mean of 3.2. The foremost perceptions of the Spiral Approach were that they keep moving upward but keep returning to the fundamentals, the teachers have the difficulty of achieving the goals such as the tools and technologies used in teaching math. It is a learner-centered approach. Teaching using the Spiral Approach is more integrative and multidisciplinary. It can provide the opportunity to collaborate with

colleagues across grade levels and courses. Teachers reinforce what is already learned, concepts. It enables students to connect disciplines.

With the use of the Chi-Square Test at α=.05, the computed Chi-Value is 3.6 and the P-value of 0.308 is greater than 0.05 this means, there is no significant relationship between the teacher's perception and the level of readiness in teaching using the spiral approach. This implies even though the teachers were ready in the overall readiness and familiar of the Spiral Approach they were undecided towards their perception of the use of the spiral approach in teaching math.

Conclusion

The results of the readiness of mathematics faculty to teach the senior high school using the Spiral Progression Approach indicate the need for professional development for Pedagogical Content Knowledge specifically in constructivist teaching. Specifically, in critical thinking and problem solving which is the twin goals of Mathematics in the K-12 curriculum. The faculty need training in classroom-based assessment specifically in rubric construction.

In addition, the faculty were moderately ready in teaching the content and skills. Despite the readiness of faculty to teach the senior high school, still undecided towards attaining the goals of a spiral approach in teaching Mathematics. This implies that it is necessary to upgrade and sustain teacher's capacities through continuous professional development for more effective implementation of the K to 12 programs.

References

[1] Bruner, J. (2015) The Process of Education. Cambridge, MA: Harvard University Press.
[2] Dimaao, Marilyn,(2015) K to 12 Basic Education Program
[3] Corpuz ,Brenda B.(2015) The Spiral Progression Approach in the K to 12 Curriculums http://pacu.org.ph/wp2/wp-content/uploads/2014/07/The-Spiral-Progression-Approach-in-K-to-12-Dr-Brenda-.pdf
[4] Mars, Jeanne C.(2015) The Goal-oriented Approach to Evaluation: Critique and case study from drug abuse treatment, University of Michigan.
[5] Prince, J.M. and Felder, M.R. (2006) Inductive Teaching and Learning Methods: Definitions, Comparisons, and Research Bases. Journal of Engineering Education, 95, 123-138. http://dx.doi.org/10.1002/j.2168-9830.2006.tb00884.x
[6] Republic Act No. 10533. Enhanced Basic Education Act of 2013. Retrieved from
a. https://doi.org /10.11/j.1467-9620.2006.00684
[7] Reston, E.D. & Cañizares,M.J.F (2019) Needs assessment of teachers' knowledge bases,pedagogical approaches
[8] and self-efficacy in K-12 science and mathematics curriculum, International Journal of Research Studies in
[9] Education, Volume 8
[10] K. Galkowski, E Rogers & D. H. Owens (1999) New 2D models and a transition matrix for discrete linear repetitive processes, International Journal of Control, 72:15, 1365-1380, DOI: 10.1080/002071799220173
[11] SEAMEO INNOTECH.(2012) K to 12 Toolkits: Reference Guide for Teacher Educators, School Administrators and Teachers.
[12] Quezon City: Philippines.
[13] Scriven, M. (1991). *Evaluation thesaurus* (4th ed.). Sage Publications, Inc.
[14] Tan, Merle C.(2015) Spiral Progression Approach to Teaching and Learning, National Institute or Science and Math Education Development, UP, Diliman, Quezon City
[15] Ulep, Soledad A. (2014) Spiral Progression in the K-12 Mathematics Curriculum UP NISMED