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

Original Research Article

Spiral Progression Approach and Academic performance of Grade 10 Junior High School Students

Asuncion T. Manalo[1]* & Alberto D. Yazon[2]
[1]*Sto. Domino Integrated High School, Santa Rosa City, Laguna, Philippines*
[2]*Laguna State Polytechnic university, Los Banos Campus, Los Banos, Laguna, Philippines*
Corresponding Author: Asuncion T. Manalo, E-mail: Anniemanalo15@yahoo.com.ph

ARTICLE INFO

Article History
Received: May 21, 2020
Accepted: June 29, 2020
Volume: 2
Issue: 2

KEYWORDS

Spiral progression Approach, Content Standards, Pedagogy, and Assessment of Learning.

ABSTRACT

The study aimed to determine the relationship between the implementation of spiral progression approach and the academic performance in ENSCIMA (English, Science and Math) of Grade 10 students in the City Schools of Sta. Rosa, Biñan and Cabuyao SY 2019 – 2020. There were 346 teacher – respondents and 1022 student – respondents from the three City Schools Division of Laguna. The data were gathered through the validated and reliability tested survey questionnaire. The data were analyzed using frequency, percent, mean, standard deviation, Pearson r, ANOVA, and t-test. The results revealed that there is a significant relationship between the implementation of spiral progression in content standard and student's performance in Science and Mathematics. There is also a significant relationship, in the strategies and instructional materials used by teacher - respondents in the implementation of spiral progression approach and the student's academic performance. There is a significant difference among teacher – respondents' assessment on spiral progression approach in terms of instructional materials when they are grouped according to age, and in terms of strategies when they are grouped according to years in service. Moreover, there is a significant difference among teacher-respondents' assessment on spiral progression approach in terms of pedagogy, instructional materials, and assessment when they are grouped according to specialization. Suggest topics on LAC sessions to address problems and difficulties in implementing spiral progression approach and motivate teachers to develop project proposal and implement it to help improve the academic performance of the students in ENSCIMA are recommended by the researcher.

Introduction

The new curriculum is about enabling teachers to actively engage students to use their learning experiences and innovative skills through computer literacy towards both critical and creative thinking. Education focuses on the mastery of student sourced learning and creating processes themselves and the transfer of learning will only be successful when teachers are equipped with various skills and learners have a profound backed up of knowledge significant for the next level of learning (Calix, 2018).

To deal with this alarming challenge in Science education experienced by many countries especially Philippines, reforms in education has been continuously taking place. Philippines implemented the K-12 curriculum which started in 2012 from grade 1 and grade 7earners and following grades continue as they move to the next year levels in the consecutive years.

Published by Al-Kindi Center for Research and Development. Copyright (c) the author(s). This is an open access article under CC BY license (https://creativecommons.org/licenses/by/4.0/)

Republic Act 10533 also known as the "Enhanced Basic Education Act of 2013" take in effect the national implementation of the K-12 one year of Kindergarten and a total of twelve years of basic education like most of the countries in the world. The features of the K-12 Enhanced Basic Education Program include the established Science and Math education which uses a spiral progression. which strengthens connectedness the year level stages and provides learners to attain content standards and performance standards according to their developmental and cognitive[stages. In the presentation of Quijano and Technical Working Group on Curriculum (2012) It is believed spiral progression can strengthen recalling and acquired content needed and proficient demonstration of skills through review and accumulated deeper and more complex of learning throughout the secondary years.

In the presentation of Tan (2012), it was mentioned that "Science curriculum framework of high performing countries (Australia, Brunei, England, Finland, Japan,Taiwan, Thailand, Singapore, New Zealand, follow a spiral progression and integrated approach at least up to G9". The presentation, however, fails to cite that in Singapore, for example, teachers who are teaching early grades are being trained to teach either math or science or any subjects such as languages and social studies. (Schools in Singapore may provide lessons for educators here, Cleveland.com).)

De Dios (2013) mentioned that in the United States spiral curriculum is considered a problem of basic education Likewise, to compare the chemistry curriculum of the achieving nations with the Philippines' DepEd K+12 curriculum, like in Singapore Grade 7 concepts fundamental to Chemistry such as ions, atoms and molecules are already part of the competency.

Public Schools in Lupon West District, Division of Makati City apparently had also been affected by this problem of spiral science curriculum. The prescribed implementation of this curriculum posted inquiries to both teachers and students on its effectiveness. Hence, it is very timely to make evaluations base on the responses among various individuals particularly from students and teachers. The ENSCIMA (English, Science and Math) teachers observed that with this spiral progression approach being used in teaching these subjects, students have no mastery with the subject matter for its discussion becomes redundant for some topics discussed in grade 7 and followed in Grade 10 in a much higher difficulty are already forgotten by the students. Instead some topics should be a review only, but what is happening in the real scenario is that the teachers are discussing again the topic. In that case the required competencies for specific grade level are not acquired by the students.

Some students stated that since there were concepts in science that were revisited each year, it seemed that the teacher was just repeating the discussions. Unfortunately, because there are some of their classmates who cannot relate their present lessons to the previous ones, their teachers tend to go back to their past lessons so everyone will be able to cope up. Thus, the students find the discussion sometimes repetitive.

Apparently, the students had a hard time to focus on four (4) areas in a year as spiral approach when compared to one subject of focus like the design of the disciplinal approach. Since the four areas of science were to be taught in one year, the division of topics for each area was seen as a difficulty of the students. They find it hard to adjust in shifting lessons from each quarter or grading period perhaps due also to the limited time in each quarter, which somehow affects their academic standing.

Literature Review

This chapter included the related literature and studies that gave relevant information to the researcher while in the process of developing the problem. The selected procedures are deemed sufficient to establish a common background for anchorage of the study.

This chapter also includes materials related to the study taken from books, journals, magazine, and abstracts in which the ideas of the studies became helpful in establishing a comprehensive discussion of the research problem. Likewise, the researcher believes that the previous studies would help in acquiring ideas on how to interpret the result.

In section 5, Curriculum development of Republic Act 10533 of the Philippines, also known as the Enhanced Basic Education Act of 2013, declared that "curriculum shall use the Spiral Progression Approach to ensure proficiency of knowledge and ability after each level. The idea in Spiral Progression approach is to provide learning experiences through different concepts and competency, until the mastery by teaching over again and again in more complex level of Difficulty anchored with high school Science curriculum,

As cited in her study by Sanchez (2014), science is a composition of four branches or areas, such as Integrated Science, Biology, Chemistry and Physics. Each area has its own competency and performance standard that learners must achieve after each quarter. For each grade level, these four areas will be visible and will be studied following a curriculum guide, now, for each of these, learning progress depending on the area being focused. Concepts, lessons and instruction will always be reviewed as their learning's developed but in a more complex way following that learners should have thorough content in science as well as, they go back to basic for them to apply learning gained during the early years in school.

The primary theories in Spiral progression approach are Constructivism, Progressivism and Behaviorism. Jerome Bruner mainly pioneered spiral curriculum and author of many investigations (Haeusler, 2013). Primary concern of Bruner theory is that knowledge acquisition is a functional and vigorous process enabling learners create different insights from what they know. The learner is taken as a determined participant in the process of knowledge transmission that identifies formation, retains, and imparts facts. The cognitive cycles like acquisition, conception and application differ upon the development of thinking skills.

Lucas (2011) pointed in his study on Spiral Progression approach in curriculum is based from Bruner's Spiral curriculum model. He also said that, as curriculum develops there must be review of the basic idea all over again, with sufficient acquisition of related concepts towards higher learning. Clark (2010) cited in his research stated that Bruner emphasized that teaching should uplift cognitive development. Student will not comprehend the content if teachers' plan the lesson according to their level of understanding added that Hilda Taba also contributed in the design of spiral curriculum based on the concepts, skills, or values integrating across and within the learning areas. It denotes how curriculum brings effect dependent on the teacher's proficiency, techniques and subject matter mastery (Duze, 2012).

De Dio (2013), argues that Science subject must be divided into different areas in high school. Sufficient knowledge of these areas demands teachers to apply spiral progression approach following comprehensive curriculum. Progressive curriculum in relation to John Dewey is the cumulative experience of a considered as a design, a written plan, list of subjects and expected output of the students. One concept is presented for many times throughout the curriculum, but with deepening level of difficulty.

Martin (2009) described spiral curriculum as a design framework that build up lessons, activities or projects aiming to the acquisition of reasoning skills not only content based, identification which greatly supports Science teachers. It involves progressive and continuous process in learning science. Progression defines personal development of the learners using education and strategies they acquire to hone their skills, knowledge and understanding in more difficult situations. Continuity is a system in education concerning ways, features and opportunities that provides enough challenge and success for learners. Hence, spiral progression approach is the method on how spiral curriculum should be implemented.

Upon attaining level of mastery of the main topic, “spirals upwards” of the new concept is introduced in the following lesson, enabling learners to strengthen whatever knowledge is acquired, in that way better comprehensive knowledge is attained. In this process, learned concept is revisited resulting to improved retention and progressively detailed topic introduced again and again brings out wider understanding and application (Mantiza, 2013).

The following are the results of spiral progression approach as cited by Snider (2004). He explained that it avoids disconnections between stages of schooling, it gives opportunities for the learners to master competencies according to their learning stages, and it intensifies retention & mastery of topics & skills as they are revisited & consolidated. Only, with the spiral design teaching lesson is most of the times extremely fast or slow. The concepts' time allotment is the same regardless their level of difficulty to master. In fact, an entire class period allotted to a particular concept makes it hard in sequencing instruction to make sure that students are equipped with needed pre-requisite skills before the introduction of a challenging skill.

In a spiral curriculum, topics are halfly tackled and approximately, teachers spend half an hour or less of the daily schedule throughout the year to 70% of the covered topics. This teaching for exposure resulted to failure of many students to master vital concepts. In short, spiral design does not promote enough review once units are completed because the lesson for intended for that quarter will never be discussed again in that particular level but in the next grade level in a higher dimension.

The content standard in each grade level is very minimal and has issues and problems since the area of concentration is very limited, needed further understanding and sufficient concentration that clearly opposes spiral progression theory and

features. In spiral progression, it is expected that they acquire more facts and theories, their level of understanding must follow vertically and horizontally.

In the study conducted by Ferido (2013) in teaching science as indicated by some respondents: Australian (Journal of Teacher Education, 2018) published that spiral approach orientation is vague and they recommended that it must ensure that the previous topics are directly related to new lessons because there are times there is no connection between the Prerequisites and the current lesson thus they are confronted to reteach taking the time which should be allotted to the new and higher competency.

This study focuses on the dilemma of teaching science subject in the Philippnes. The review reveals theoretical and philosophical ground of spiral progression but few verifiable studies are conducted in the area of science. Study on this topic in the Philippines is in insufficiency if not existence; since this approach was just fully implemented in 2012 It seeks to find out competency level of science teachers in teaching science implementing approach. Curriculum is a dynamic process.

Methodology

This chapter includes the method of research, the respondents, the instrument utilized in the investigation, the data gathering procedure, and the statistical treatment.

Research Design

The researcher utilized descriptive-correlational method in this paper. Descriptive research is a study that can obtain facts about existing conditions or detect significant relationships among current phenomena (Salvador et. al., 2008). It describes systematically a situation of area of interest factually and accurately. Through this research, decision can be made for improving, maintaining, and rejecting the focus to make it effective and efficient.

Since the study described the impact of Spiral Progression Approach in teaching English, Science and Mathematics and its relation to the Academic Performance of Grade 10 students and the findings are the bases to formulate a plan, descriptive method is most appropriate to use. The teacher respondents and student respondents check the column where they will rate the implementation of Spiral Progression Approach in Teaching English, Science and Math and also the teacher – respondents rate the difficulties encountered in the implementation of Spiral Progression Approach in terms of strategies and instructional materials while the students also rated the difficulties encountered in the implementation of Spiral Progression Approach.

Respondents of the Study

The Grade 10 students and ENSCIMA teachers of the three City Schools Division of Laguna namely, Sta. Rosa, Biñan and Cabuyao for the SY 2019 – 2020 were the respondents of this study. Slovin's formula was used in calculating the desired number of sample size. There were three hundred twenty- two (322) grade 10 students out of one thousand six hundred ninety- five Grade 10 students from Division of Sta. Rosa City, while there were three hundred sixty three (363) out of four thousand thirty three (4033) Grade 10 students from Division of Binan and in the Division of Cabuyao, there were three hundred thirty seven (337) respondents out of two thousand one hundred six (2106) Grade 10 students, while there were three hundred forty - six (346) ENSCIMA teachers out of five hundred two (502) ENSCIMA teachers from Division of Sta. Rosa City, and in the Division of Binan, there were ninety one (91) respondents out of one hundred eighteen (118) ENSCIMA teachers, while in the Division of Cabuyao, there were one hundred four (104) out of one hundred forty one (141) ENSCIMA teachers in which all the respondents were randomly selected through proportional stratified random sampling. The second and third quarterly tests result were compared. The assessment of the survey questionnaire for teachers and students were gathered and interpreted.

Research Instruments

The research utilized instruments by the researcher were the following: the questionnaire regarding the profile of the teacher -respondents in terms of age, gender, civil status, years of service, and course of specialization, questionnaire for student – respondents regarding the profile in terms of age and gender, the survey questionnaire for the assessment on the Implementation of Spiral Progression Approach in terms of content standards, pedagogy and assessment of student learning and the problems and difficulties encountered by the teachers in the implementation of Spiral progression approach, survey questionnaire on the difficulties encountered in the implementation of Spiral progression approach was also given to the student – respondents the second and third quarterly test results of the student, validation tools for questionnaire and the correspondence for the three division offices.

The researcher made a research on different questionnaire related to the study on spiral progression Approach and some questions were adapted from the study of Hazel De Ramos Samala (2017), on Spiral Progression Approach in Teaching Science, questions on Teacher's difficulties and students' difficuliieswere adapted from her study while some items on the questionnaire regarding on the perception on the Implementation of the Spiral Progression Approach was adapted on the Research article on Spiral progression approach in teaching Science by Edwin C. Valin (2019).

Pilot testing of the first draft of the questionnaire was given to all ENSCIMA teacher of Sto. Domingo Integrated High School and to the cream section of grade 10 for the student's respondents to test the questions to test content, construction, linguistics and appropriateness, then Mathematics Education Program Supervisors, Science EPS, PSDS and Research Program Specialist and English Teacher from Sta Rosa City, evaluated the crafted questionnaire using the adapted validation tools focused on clarity, wordiness, negative wording, overlapping responses, balance, use of jargon, appropriateness of responses listed, use of technical language, the content (assessment on content standards, pedagogy, assessment of learning ,difficulties encountered by teachers in terms of strategies and instructional materials, assessment of students on content standards and problems encountered on the implementation of Spiral Progression Approach)The comments and suggestions were integrated in the final draft and approval was secured. Since the rating was very satisfactory and certified as evaluated and validated, the draft was finalized and reproduced for distribution.

The developed questionnaires in the survey of respondents' profile in terms of sex, age, and years in teaching of the teacher 'respondents while questionnaire in the survey of student's respondents profile in terms of age and sex, gave the frequency for descriptions and comparisons of the respondents.

The crafted and validated checklist of teachers' perception on the implementation of spiral progression approach in terms of content standards, pedagogy and assessment of learning for teacher- respondents and perception in terms of content standard by the student- respondents, provided data for description and determining level of influence in the Academic performance of Grade 10 students in ENSCIMA during the second and third quarterly tests being the bases.

The crafted and validated checklist of difficulties encountered by teachers in the implementation of Spiral Progression Approach in terms of strategies terms of strategies and instructional materials for teachers and problems encountered by the student- respondents, content standards provided data for descriptions and determining the relationship of the variables to the Academic performance in ENSCIMA with the second and third quarterly tests in SY 2019 – 2020 of the student – respondents were utilized.

The Second and Third Quarterly test results were gathered from school-respondents through the School Governance and Operation Unit. The data were utilized to see the relationship between the second and third quarterly tests scores and the mean scores in the survey questionnaire for teacher and student respondents to determine the relationship of the Spiral Progression Approach to the Academic performance of Grade 10 students in the ENSCIMA.

Research Procedures

The researcher secured a written permission to conduct the study from the Schools Division Superintendent of Santa Rosa City, Biñan and Cabuyao for indorsement to school-head respondents in the three divisions. The researcher discussed with the school heads the details and procedures of the study that to be conducted. The second and third quarterly test results of the student respondents were gathered while survey questionnaire was administered to the teacher and student respondents.

Utmost care was taken so as not to disrupt the classes of the teacher-respondents and respect the identity and integrity of the respondents by observing Data Privacy Law. The researcher personally distributed and retrieved the questionnaires. Then the gathered data were classified, encoded, summarized and analyzed

Statistical Treatment of Data

The profile of the respondents was described in terms of frequency count and percentage. Mean and standard deviation were used to report the assessment of teachers and students in spiral progression approach in terms of content standard, pedagogy, and assessment on students learning. Meanwhile, MPS was computed to gauge the academic performance of the student – respondents in English, Science, and Mathematics.

To determine if there is significant relationship between the respondents' assessment on spiral progression approach and the Academic Performance of Grade 10 Junior High School students in ENSCIMA, Pearson r was employed.

One way Analysis of Variance was used to assess if there is a significant difference on teacher assessment when they were grouped in terms of their profile. Post hoc test was employed to assess where the significant differences lie. Moreover, independent t-test was used to determine if there is a significant difference on student assessment on spiral progression approach when their sex and age were considered.

Results and Discussion

The main objective of this study was to determine the relationship between spiral progression approach and the academic performance in ENSCIMA (English, Science and Math) of Grade 10 Students in the City Schools of Sta. Rosa, Cabuyao, and, Biñan.

Most of the teacher-respondents are early thirty's and late forty's female and teaching Mathematics, English and Science for more than a decade now. Meanwhile, majority of the student – respondents are 15 – 16 years old and almost equally represented by male and female students. This revealed that there were more teachers at their middle years compared to the other groups and few teachers were in the latter years of their age or at the age nearly to retire. The results might mean that younger teachers are beginning to replenish the older teachers. It also suggested that the attrition rate in the teaching profession is getting higher that there is a demand for the recruitment of new teachers who are either fresh college graduates or are career-changers.

In terms of the mean assessment of teachers in the three city schools divisions on the implementation of spiral progression approach, they reported that the content standard, pedagogy, assessment of learning are very evident in their classroom practices. The teachers agree that they encounter difficulties. in strategies and in the use of instructional materials as they implement the spiral progression approach The content standard listed per year level is is changing quarterly, the focus is affected, lacks thorough discussion, and not focused in one specialization, some are not parallel with spiral progression standards. In spiral progression, if more content or topic are incorporated, knowledge and retention develop more meaningful and deeper (Ferido, 2013).

According to the student – respondents, the implementation of spiral progression approach in terms of content standards is considerably good. They moderately agreed that they encounter some problems in studying using the said approach. Some students thought that they will be able to attain skills demonstration much if there are more practical lessons practices and exercises in actual situations (Edomwonyi-Otu & Avaa, 2011). At times, activities were not performed due to unavailability of materials

The results revealed that students obtained an average academic performance in terms of their MPS in English, Science and Mathematics during the 2nd quarter and 3rd quarter. This may imply that the academic performance of students may be attributed to different factors not only on the implementation of spiral progression approach. Learner attributes can be described as personal, academic, social/emotional, and /or cognitive in nature (Drachster & Kirschner, 2012).

There is a significant difference among teacher – respondents' assessment on spiral progression approach in terms of instructional materials when they are grouped according to age. Similarly, there is a significant difference among teacher-respondents' assessment on spiral progression approach in terms of strategies when they are grouped according to years in service. Inan and Lowther (2010) discovered that a teacher's age and years of teaching have negative effects on both their computer proficiency and technology integration, suggesting that the older teachers are less computer proficient and integrate technology less than younger ones.

Moreover, there is a significant difference among teacher-respondents' assessment on spiral progression approach in terms of pedagogy, instructional materials, and assessment when they are grouped according to specialization. This result may imply that different specialization of teachers the spiral progression approach has impact on their teaching learning process how much more if the teacher, teaching a particular subject.

Aside from that, teachers find it difficult to teach subjects who are not their major field of specialization, knowing that the new curriculum is not disciplined based, thus they need to restudy the lessons before presenting it to their learners (Casil, et al., 2018)

There is no significant difference among student-respondents' assessment on spiral progression approach when they were grouped according to age and sex. According to Clack et al (2015), in their study "Age-Related Differences in the Ability to Learn of Students", they found out that young and older adults generally demonstrate a similar ability to learn new things. The study also concluded that the ability to acquire knowledge is largely unaffected by cognitive aging.

At 5% level of significance, there is a significant relationship between the extent of implementation of spiral progression in terms of content standard and student's performance in Science and Mathematics. Pedagogy and assessment of student learning reveal no significant relationship to student's academic performance. (Mushtaq & Khan, 2012) studied the different variables affecting students' performance. It aimed to investigate student's performance in intermediate examination linked to students' outline including the approach towards communication, learning facilities, proper guidance, and family stress.

The strategies and instructional materials used by teacher - respondent's in the implementation of spiral progression approach has a significant relationship to student's academic performance Length of service in the study made by Garbo (2012) revealed that those who have 11 years and above in service achieved better performance than those who have eleven (11) years in public service.

According to oecd.org, teachers' way of thinking, practices and attitudes are vital to understand and improve educational processes. They are closely related to teachers' strategies to face with challenges in their daily professional life and to their general well-being and they create students 'learning environment and influence student motivation and achievement. There is no significant relationship between the student - respondents' assessment on spiral progression approach and their academic performance in ENSCIMA.

Conclusion

Based on the abovementioned findings of the study, the following conclusions are drawn:

Since there is a significant difference among teacher – respondents' assessment on spiral progression approach in terms of instructional materials when they are grouped according to age; strategies used when they are grouped according to years in service.; and pedagogy, instructional materials, and assessment when they are grouped according to specialization, therefore the null hypothesis stating that there is no significant difference among teacher-respondents' assessment on spiral progression approach when they are grouped according to their profile variables is partly upheld.

The null hypothesis reiterating that there is no significant difference among student-respondents' assessment on spiral progression approach when they are grouped according to age and sex is sustained. This may be because students regardless of their age and sex have the same perspectives and ideas on the implementation of spiral progression approach.

A significant relationship exists between the implementation of spiral progression approach in terms of content standard, strategies, and instructional materials, and the academic performance of Grade 10 Junior High School students in Science and Mathematics. Hence, the null hypothesis stating that there is no significant relationship between the teacher-respondents' assessment on spiral progression approach and the academic performance of Grade 10 Junior High School students in ENSCIMA is partly upheld.

References

[1] Casil, C. (2018) Assessment on the Spiral Progression of the K to 12 Curriculum Western Mindanao State University.
[2] Clark, S. (2010) Jerome Bruner Teaching – Learning and Spiral Curriculum, Community and Thought in Education. Retrieved from http:// Spiral Progression Approach.jerome – bruner-teaching – learning – and spiral - curriculum 2 . pdf
[3] De Dios, A. (2013). Spiral Curriculum: When and How? Redundant versus Progressive?Retrievedfrom:http://www.philippinesbasiceducation.us/2013/05/spiral-curriculum-when-and-how.html#ixzz48IUWrBDt

[4] DepEd Order 31 s. 2012 "Policy Guidelines on the Implementation of the Grade 1 to 10 of the K to12Drachster, H. Kirschner, P.A.(2012) Learner Characteristic. In Seel N. M (eds) Encyclopedia of the Sciences of Learning, Springer, Boston, MA
[5] Dyer, J. E., & Osborne, E. W. (1995). Effects of teaching Approach on Achievement of Agricultural Education Students with varying Learning Styles. Proceedings of the 22nd Annual National Agricultural EducationResourch Meeting, 22,260-271 [11] Gill, E. (2013), What is your teaching style? 5 effective methods for Your classroom.
[6] Edomwonyi-Out, L., & Avaa, A. (2011). The Challenge of Effective Teaching of Chemistry: A Case Study. Leonardo Electronic Journal of Practices and Technologies 18, 1-8.
[7] Ferido, M. (2013). The Spiral Progression Approach in Scienc http://www.ceap.org.ph/upload/download/20137/137150183_1.pdf
[8] Haeusler, C. (2013). Examining The Curriculum And Assessment Framework Of The Australian Curriculum*:* Science.
[9] Inan, F. & Lowther D. (2010): Factors affecting technology integration in K – 12 Classroom A path Model.Educational Technology research and Development
[10] Lacanilao, F. (2012). A Critique of Some Commentaries on the Philippine K-12Program.Retrievedfromhttp://josecarilloforum.com/forum/index.php?topic=2326.
[11] Mantiza, M (2013) Spiral Progression in Science.https://www.slideshare net BESPF/ Spiral Progression in Science.
[12] Martin, B.(2009). Obstacles to Academic Integrity. Proceedings of the 3rd Asia Pacific Conference ofEducational Integrity:CreatingaCulture of Integrity University of South Australia [2]
[13] Montebon, D. (2014). K-12 Science Program in the Philippines: Student Perception on its Implementation. International Journal of Education and Research 2(12), 153-164
[14] Mushtag, I. & Khan, S (2012) Factors Affecting Student's Academic Performance.Global Journal Of Management and Business Research 12, 16 - 22
[15] Orbe, J. R., Espinosa, A. A., & Datukan, J. T. (2018). Teaching Chemistry in Spiral Progression Approach: Lessons from Science Teachers in the Philippines. Australian Journal of Teacher Education, 43 (4). http://dx.doi.org/10.14221/ajte.2018v43n4.2
[16] Palardy, G. J., & Rumberger, R. W. (2008). Teacher Effectiveness in First Grade: The Importance of Background Qualifications, Attitudes, Instructional Practices for Student Learning. Educational Evaluation and Policy Analysis, 30, 111-140. http://dx.doi.org/10.3102/0162373708317680 [16]
[17] Resurreccion, J. A., & Adanza, J. (2015). Spiral Progression Approach in Teaching Science in Selected Private andPublic Schools in Cavite. Presented at the DLSU Research Congress 2015 De La Salle University, Manila, Philippines March 2-4, 2015 Spiral.Proceedings of the DLSU Research Congress Vol. 3 2015.
[18] Samala, H. R (2017) Spiral Progression Approach in Teaching Science: A Case Study Article (PDF Available) June 2018 *with* 2,184 Reads DOI: 10.18502/kss.v3i6.2404
[19] Sanchez JM. Integrated macro-micro-symbolic approach in teaching secondary Chemistry. Kimika. 2017; 28 (2), 22-29. DOI: 10.26534/kimika. v28i2.22-29
[20] Snider, VE. & Crawford D.(2204) Mathematics In N. E. Marchand – Montella T. A. Slocum, S R C Martella (eds) Introduction to Direct Instruction pp 206 - 249.Boston; Ally & Bacon.
[21] Tan, M.(2012) Spiral Progression Approach to teaching and learning University of the Philippines, Diliman, Quezon City, National Institute for Science and Mathematics Education development https//www.ceap.org.phi upload download 201101606141386
[22] Valin, E.& Janer, S (2019) Spiral Progression Approach in Teaching Science and Computing Volume 9 Issue No. 3 March 2019.