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Enhancing the Scientific Research Skills of Grade 9 Students Through Constructivist-Based Instructional Enrichment Material

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Abstract: This study aimed to enhance the scientific research skills of the Grade 9 high school students through constructivist-based instructional enrichment material. Learning competencies in Research 1 as prescribed during the first quarter was developed. These lessons include scientific research skills to be enhanced by the students. The respondents were the Grade 9 high school students with a population size of 115 enrolled in Science, Technology and Engineering (STE) Program. A questionnaire was developed and validated to determine the level of scientific research skills. Afterwards, the material and the achievement test were developed, evaluated and validated. The administration of the pretest was conducted. Afterwards, the learning material was utilized which is intended for the first quarter to test the validity of the material then the post-test was administered. One group pretest-posttest design was used to determine if the pretest and posttest scores have significant difference. The researcher used range intervals with corresponding descriptive ratings to interpret the level of scientific research skills. Two-sample z-test was used to assess the significant difference between the scores of pretest and posttest. The weighted mean was used to determine the level of acceptability towards the material. It was demonstrated that "comparing and contrasting" has the highest mean value which is 8.14 that falls under "highly skilled" while scientific research skills such as "causal explanations," "classification," and "generating and testing hypotheses" have corresponding mean values of 3.67, 3.60 and 3.42 respectively that fall under "less skilled". The developed instructional material includes topics such as introduction to research, study and thinking skills and investigative processes. The mean value of the student-respondents in posttest (38.71) is higher than the mean value for pretest (21.67). The calculated z-value of 27.085 is greater than the critical z-value of 1.96 with a level of significance that is equal to 0.05. Thus, the null hypothesis was rejected. The weighted mean values for the level of acceptability of the material are 3.50, 3.42, 3.37, 3.40, and 3.44 for the learning objectives, activities, clarity, appeal, and usability. These criteria fall under "strongly agree". Research findings revealed the student-respondents need intervention materials especially for those who are less and moderately skilled. The developed material is ready for adoption since it was revealed that it is a valid tool which is commendable for use. Teachers may adopt the developed instructional material in enhancing the scientific research skills to improve the least mastered scientific research skills.

Keywords: Scientific Research Skills, Constructivist-Based Learning, Instructional Enrichment Material, Grade 9

1. Introduction

In the Philippines, secondary education is prepared towards the development of science and technology through the application of research skills. One of these objectives is to elevate the quality of educational standards that school gear in the direction of imparting excellence and honing capable individuals who can right away react to the needs of time. As a result, Borich, G. emphasized that teachers, school administrators and other educators call for a commitment to develop a curriculum that concentrate on teaching learners critical thinking and reasoning, and problem solving in real world contexts, or in general, enhancing the scientific research skills [11].

Research is defined as a process of scientific thinking that leads to the discovery of scientific truths. Lofranco, L.

explained that it is an attempt to achieve systematicity and with the support of data to answer a question, offer a resolution to a problem, or for a greater understanding of a phenomenon [37].

During the past few years, teachers and school administrators have been confronted by several difficulties related to the level of academic accomplishment of students particularly in the field of science and research. The local indication of this problem could be seen in several results of quite a number of assessments and evaluation in which the general mean percentage scores appeared to be consistently at the base.

It was reported that given the poor scientific research skills of many students the different academic programs can be expected to lack appropriate scientific research skills. Harlan, J. stressed that if this is the case, educators in these programs will need to be concerned with the development of their students' scientific research skills [29]. That is, without training in appropriate scientific research skills, many students will be unable to obtain the full benefit of education programs and will have considerable difficulty updating job-related skills on their own.

In addition, Aquino, G. emphasized that to achieve these skills, educators must search for more effective teaching strategies. In the educative process, instructional materials are classified as the fundamental sources of learning [4]. These materials are considered to be as tools in the teaching-learning situation. Instructional enrichment materials are important aspects in the educative process. It is an essential factor for the attainment of a variety of learning concepts. It becomes a predominant way of instruction. If instruction is identified to be what we need to help the learners to achieve the enhancement of scientific research skill, teachers need to determine also the content and the skills that must be understood from the instruction.

Conducting research is done to improve school practices and at the same time to improve the students who strive for constructivism that includes the use of investigative learning activities. Investigative learning activities involve the use of research process or scientific method within the area of constructivism. It provides the learner realistic and applied experiences in using research processes and helps stimulate their awareness in constructivism. Given the benefits, the whole community can realize from scientific research skills such goals and objectives in themselves have importance. The outcome of enhancing these skills frequently involves a discovery that can improve the lives of humanities or even protect the environment.

1.1. Background of the Study

The low achievement test results among the students in several assessments and evaluations in National Achievement Test (NAT) conducted annually experienced by the researcher only proves that there is a low mastery of learning competencies resulting in poor quality of basic education. The majority of the students both in the public and private schools who graduated from the secondary level failed to achieve the full mastery in several disciplines, particularly in the field of science based on the teaching experiences of the researcher. Primarily, this problem can be associated with inadequate learning resource materials.

In addition, scientific research skills are best learned when they are integrated with domain-specific content in the courses students are currently taking. Scientific research skills taught in isolation from course content are unlikely to be utilized effectively. Thus, classroom teachers must be involved in the development of scientific research skills. Harlan, J. have found a significant lack of scientific research skills in both high school and college students in baccalaureate degree programs [29].

Adding, Killen, R. stressed that the enhancement of skills is of greatest significance among learners [35]. Developing several skills includes a variety of activities to pursue such learning. Different skills must be enhanced so that learners will acquire prowess in several disciplines to become more prepared and productive in real-world tasks and activities. One of these skills is the scientific research skills. Such skills need expectations can be done by having a well-defined objective to understand what activities should be accomplished that will eventually lead to possible product or outcomes that can be derived out of these research questions.

There are several negative attitudes that are labelled among the students in relation to scientific research experienced by the researcher during the learning process. Some of the students who have difficulty in reading skills may be disadvantaged in conducting research project that requires them to make extensive use of written materials. It is the same thing with those students who have difficulty in writing skills. Although students may learn a lot from a research project, students can have difficulty demonstrating what they have learned. At all levels of education, one of the most difficult things for some students to do is to write, particularly when it is required to explain their ideas or opinions on data gathered. Some students find scientific research very frustrating since they do not have the necessary research skills. This is because learning through research requires a lot of self-direction. Some of the students may not have this ability. There are some instances that the students are unable to complete a science investigatory project most especially if it becomes unmanageable. Students become disillusioned and discouraged from participating in this form of learning in the future. Despite the researcher's best efforts to make scientific research an engaging learning experience, some of the students perceive it simply as a project to be completed with minimum effort. Some of the students plagiarize material, coerce their parents into doing the work or fabricate results.

The above problems and negative attitudes of some students are some times that were encountered by the researcher. Thus, this research study was conducted to solve the problems and achieve the benefits of scientific research accompanied with careful planning and monitoring of students' research closely.

For these reasons, the researcher sought to design a

constructivist-based instructional enrichment material to meet the specific needs and enhance the scientific research skills of Grade 9 students. This study was conducted due to several learning difficulties met by the students in conducting a research as experienced by science teachers particularly by those previous research teachers. This research study is in line with the purpose of the Department of Education to enhance the academic performance and skills among the students in academic subjects particularly in the field of Science. The researcher aims to evaluate and enhance the scientific research skills of the Grade 9 students. The researcher perceived that with the aid of a constructivist-based instructional enrichment material, the cognitive level and scientific research skills can be enhanced.

1.2. Objectives of the Study

This study sought to enhance the scientific research skills through the use of constructivist-based instructional enrichment material in Research 1 for the Grade 9 learners of Quezon National High School (QNHS). In addition, the study aimed to answer the following objectives: (1) determine the level of scientific research skills among student-respondents in terms of using instructional materials, summarizing, organizing and interpreting data, comparing and contrasting, classification, causal explanation, recognizing experimental variables, generating and testing hypotheses and analyzing, interpreting and relating the results of experiment; (2) design an instructional material that will enhance the scientific research skills among the students; (3) determine if there is significant difference between the pretest and posttest of the Grade 9 high school students; and (4) find out the level of acceptability of the learning material as perceived by the student-respondents in terms of learning objectives, learning activities, accuracy and clarity, appeal, and usability.

1.3. Literature Review

Scientific research skills deal with the development of the cognitive, psychomotor and affective domain that will move towards the employment of scientific ways of satisfying their own curiosities and inquiries that serve as a paramount goal which they carry up to adulthood.

Furthermore, Harlan, J. emphasized that classroom teachers need to help students to develop more effective scientific research skills [29]. Scientific research skills programs based upon assumed student needs, however, may waste significant time and other resources in teaching students what they already know while leaving important deficiencies unremediated. Thus, program development should be based upon assessment of students' actual strengths and weaknesses.

For example, Slate, J. implemented a successful scientific research skills program for secondary students that involved monthly assessment of students' scientific research skills [51]. These assessments allowed the teacher to adapt instruction continuously to students' most significant needs. This can illustrate how scientific research skill analysis can be used to modify instruction. Padilla, M. et al. discussed that it is systematically integrated scientific research lessons into a science curriculum. Those having scientific research training outscored than those who experienced the two week unit [49]. These results indicate that the more complex scientific research skills cannot be learned via a two week unit in which science content is typically taught. Rather, scientific research skills need to be practiced over a period of time. Turpin, T. completed his study about the effects of the scientific research skills training on the students' achievement and attitude [56]. The students who had scientific research skill training succeeded more than the students who had traditional training. This result shows that giving scientific research skills training increased the academic achievements of the students. Meador, K. explained that individuals need to think critically and creatively to be able to enhance their scientific research skills in order to develop a fundamental scientific understanding since it is important for each student to begin his or her educational life by applying scientific research skills [35].

Scientific research skills are believed to be one of the most effective and accomplishment-guaranteed learning outcome in the field of science pedagogy. Enriching scientific research skills reveal the maximum pledge in handling learning activities in relation to the achievement of the paramount goal of science teaching for the 21st century – the enhancement of scientific literacy. Educators characterized these skills as analytical and exploratory activities performed by many scientists. Harlen, W., Allende, J., and Salandanan, G. highlighted that scientific research contains a wide variety of experiences that allows the students to enhance critical and creative thinking about the science concepts about the natural phenomena around us by means of this approach [30, 50]. Beerer, K. and Bodzin, A. claimed that scientists employ research skills which are considered to be the science process skills in order to conduct investigative procedures [10]. In addition, Holbrook, J. and Rannikmae, M. stressed that scientific research greatly scaffolds the students in order to achieve manipulative process skills since Inquiry Based Science Education (IBSE) enhance the active participation of the students for them to construct understanding in such a way that the teacher will serve as a facilitator in accordance to the concept of the 21st century classroom setting [31].

Likewise, Cuevas, P., et al. pointed out that enriching the scientific research skills scaffold the learners to improve the capability and aptitude in examining for alternative explanations to give answers to questions, obtain data and information and formulate conclusions and generalizations [18]. It provides such value to those self-motivated learning activities operated after the scientific processes. Students examine several things in the environment, classify and evaluate information and construct their own meaning. In this way, learners are involved in several processes like analyzing, evaluating and synthesizing information. This will eventually result to discovering general concepts. In a science classroom, it is essential to enhance scientific research skills so that the learners understand the scientific concepts. The notion about

concept mastery refers to the learners' knowledge and perception about the ideas that exist in psychomotor and cognitive skills. Likewise, it also refers to the learners' capability to employ these domains of learning objectives in science. In order to acquire different types of information, learners should learn the scientific research skills. Likewise, Dahar, R., Feyzioglu, B., et al. and Gay, L. and Airasian, P. emphasized that research skills can be taught using science process skills [19, 23, 26]. In the end, learners will become self-sufficient who are in capable of learning on their own pace. It can be inferred that students who can interact with their environment are considered to be inquisitive. Once the learners go along with several verifications of information being settled, at the same time they will understand how to classify, compare, analyze and evaluate collected information and other forms of data.

The use of scientific research skills do not necessitates educators to mention the procedures in order to obtain data because the learners are recognized as independent. Learners state their hypotheses and recommend several alternatives in order for it to be tested. Thus, they are thought to be as active learners since they are well-motivated. This acts as the best indicator of their inquisitiveness. Also, the solutions that were gathered from several techniques by means of their exertion can be categorized as real or authentic. Thus, Hanauer, D. discussed that it can give the learners a taste of real scientific investigation [28]. This will guide to some breakthroughs and innovations which will serve as an excellent reward that has the potential to give a significant impact in science instruction. Focused questions before, during and after science instruction are crucial factors that will give some guidance and maintain the action in scientific research. However, Tang, D. argued that focusing on the scientific method as discrete steps can distract students from their ongoing, productive research and can also draw teachers' attention away from students' productive research [52]. Emereole, H. mentioned that there are also several studies that revealed that some teachers have inadequate understanding with regards to scientific research [22]. This can serve as a hindrance in developing and planning science process skills which are considered to be critical for teaching scientific research. Lander, J. stressed that learning about the scientific research skills involved, such as formulating appropriate research objectives, formulating research designs, collecting and analyzing data well as sharing the implications is best performed through active participation in the process [36].

Hence, Anderson, R., Ministrell, J., Turkmen, H., and Kandemir, E. M. pointed out that in order to make some progress in terms of scientific research skills learners necessitate the preparation of science educators when it comes to science processes [3, 40, 55]. Furthermore, Aydogdu, B. and Karsli, F. highlighted in that the integrated process skills of science teachers were not at a satisfactory level [6, 34]. Additionally, Isik, A. and Nakiboglu, C. discussed in their studies that majority of teachers do not have the capability to enhance research skills among the students within the science classroom [32]. Mutisya, S. underscored that science educators must knowledgeable when it comes to scientific research to ensure that their students can acquire these skills within the preferred level [42].

Nyakiti, C. explained that scientific research skills possess several characteristics in which the science educators must be aware of. Science content within the research settings must be employed in order to enhance the science process skills [47]. These skills as part of research can be classified into two (2) namely basic and integrated. Likewise, Chiappetta, E., Koballa, T., Mutlu, M., and Temiz, B. emphasized that integrated process skills include formulating hypotheses, manipulating variables, organizing and interpreting data, testing hypothesis as well as preparing a research design necessary for experiments [17, 43]. Ozgelen, S. stressed that it necessitates a more progressive foundation of knowledge [48]. Moreover, Bayraktar, S., National Association for Research in Science Teaching and the National Center for Education Statics recommended that basic science process skill includes observation, communication, classifying, investigating, inferring, hypothesizing, predicting, organizing and interpreting data as well as experimenting [8, 44, 45, 46]. Likewise, Fraenkel, J., Gacelo, E. and Karamustafaoğlu, S. suggested the same examples of investigative skills as integral part of instructional characteristics of research approach [24, 25, 33]. Moreover, Borich, G. discussed that in the process of enhancing the scientific research skills, students identify problems, generate some possible solutions, formulate questions, investigate, analyze and interpret results, discuss, reflect, make conclusions and present results [12]. Aziz, F., Ahmad, G., Teo Yew Mei, R., Dirks, R. et al., and Chabalengula, S. et al. discussed the relevance of the advancement of scientific research has been revealed in several studies [7, 16, 21, 53].

Interesting lessons can be maintained inside the classroom if appropriate media is used in the presentation. Carefully chosen, its effect on the interest and attention, involvement of learners has long been introduced to a point that this varied collection of instructional tools received the title "sub-strategies." Mulhayahtiah, D. et al. emphasized that through the use instructional materials using learning modules for instance, these sources can enhance the problem-solving skills across different learning areas [41]. However, Bebell, D. discussed the effectiveness of instructional material depends upon the manner and the degree to which they meet the needs of teachers and students based on the learning objectives [9]. In addition, Bukoye, R. emphasized that instructional material should have the following characteristics: (1) stimulate students' interest; (2) enrich students' experience; (3) make learning meaningful; (4) develop mental imagery of the student; and (6) develop the power of observation and generalization [15]. The study stressed important guideline in designing and developing instructional material. This can be done through enhancing the module with media such as charts, graphs, maps, still images, animation or video to arouse the interest and

motivation of the students in learning the subject matter.

Dargo, J. and Dimas, M. mentioned that with use of instructional module, learners can regulate their time management as well as the pace of their learning in accomplishing the different tasks as prescribed in the instructional module [20]. Moreover, Zainuri, A. et al. discussed in the study that there is a proposed course of action of organized instructional design on how to get involved in developing the instructional material – it must be followed after the application of instructional goals, objectives, audience and instructional analysis as well as strategies [57]. These materials must depend on the learners' capability. Hence, many individuals will participate actively with the use of varied learning materials resulting to its effectiveness.

Amalia, S. and Wuryandani, W. revealed in the study that instructional material can be used when it comes to the developing a diagnostic test on problem solving and critical thinking skills [5]. It was also revealed on the said study about the development and validation of instructional material in genetics that there is a significant difference between the pretest and posttest scores of the students in the achievement test. Therefore, the use of instructional material is effective in teaching the subject matter. Likewise, Buendicho, F. stressed that instructional enrichment materials play a vital role in enhancing the learning outcomes of the students when it comes to the teaching-learning process [14].

Brain researches have also found that for students to learn they must experience appropriate levels of challenge. Lastly, Green, F. explain that the human brain needs to make its own meaning of ideas and skills. The brain cannot effectively retain lots of unconnected facts so students need to see patterns in connection [27]. Tomlinson, C. suggested that when teachers assign work, it should be equally interesting, equally appealing and equally focused on essential understandings and skills. Thus, teachers should prepare instructional materials that will catch the interest of students [54].

Likewise, Abrantes, G. highlighted that students' interest reflects input into the course, such as attention level in class, interest in learning the material, perception of a course's intellectual challenge, and acquired competence in the field [1]. Students' interest facilitates effective teaching and creates a more favorable learning environment with the integration of constructivist-based approach.

Bruner, J. explained constructivism as a learning theory in which the concept of the spiral curriculum was integrated for the 21st century Science, Technology, Engineering, and Mathematics (STEM) Curriculum [13]. This involved information that were structured so that complicated ideas can be delivered in a simple manner first, and then re-visited at higher levels later on. Hence, learners would be taught at levels of gradually increasing difficultly (hence the spiral analogy). Preferably, teaching in this manner should direct learners to be able to provide solutions to the existing problems.

Bruner, J. explained that constructivism allows the learners to build their own knowledge through organizing and categorizing information using a coding system [13]. It was considered that the most efficient process to develop a coding system is to explore it instead of relying heavily to the teacher. The application of the spiral curriculum can help the process of research learning. Constructivism is a philosophy in education that suggests that learners are required to create their own understanding about the new ideas. Several researches about constructivism were discussed by well-known educators from the past decades in the fields of learning theory and cognition. Well-known authors like Jean Piaget, Eleanor Duckworth, George Hein, and Howard Gardener have discovered these ideas in-depth.

In constructivist approach of teaching, the learners develop their skills through examining and evaluating evidences, experiencing and discussing, and talking to their colleagues about their own understanding. Learners work in groups with others to provide solutions to the problems including planning of investigations. Most of the learners find that the learning process is effective when they work with others in a collaborative environment in contrast with working alone in a highly competitive environment. When they are active, cooperation in the group is directed toward scientific research, and the learners tend to succeed in performing their own explorations. They formulate questions, observe, analyze, interpret, discuss, formulate conclusions, and ask a new set of questions. These research-based learning include both those that involve learners performing hands-on activities and those in which learners formulate explanations through critical and logical thinking. Bruner, J. stressed that both critical and creative thinking skills fall under constructivism approach of discovery learning [13].

2. Methods

2.1. Locale of the Study

This study was conducted at Quezon National High School (QNHS). It is a public secondary school located at ML Tagarao Street, Brgy. Ibabang Iyam, Lucena City, Quezon Province, Philippines. The said school consists of 11,000 enrollees from junior and senior high school, placing it as the most populated school in the region. It was founded on October 1902 when Aubrey Boyles, a Thomasite, organized a school in a convent of Lucena on the northern side of Saint Ferdinand Parish Church.

The school aims to produce students who are both academically inclined and substantially trained in the basic work skills making them globally competitive and value-oriented through relevant and responsive curriculum. In relation to the school's mission, several curricular programs were offered to address the student's needs and competencies. It includes the Science, Technology and Engineering (STE) Program, Special Program for Sports (SPS), Special Program for Journalism (SPJ), Special Education for the Hearing Impaired (SPED) and the Open High School System (OPHSS).

2.2. Research Design

This study employed one group pretest-posttest design which was utilized to validate the constructivist-instructional enrichment material. Thus, the significant difference between the mean scores of both pretest and posttest was evaluated that proved the enhancement of scientific research skills through the use of the said validated learning material.

2.3. Sample of the Study

The participants for this research includes the Grade 9 high school students with a population size of 115 enrolled in Science, Technology and Engineering (STE) Program of Quezon National High School. This group of respondents were selected by the researcher since Research 1 is one of their elective subjects in the said program offered by the Department of Education.

2.4. Research Instrumentation

Research instruments were designed by the researcher to ensure the data gathering procedure as well as its validity and reliability in order to generate answers for the objectives of the study. This includes the following:

2.4.1. Questionnaire on the Level of Scientific Research Skills

Prior to designing of an instructional enrichment material in Research 1, the researcher used several reference materials to come up with the idea in constructing a questionnaire on the level of scientific research skills. The purpose of this assessment is to determine the level of scientific research skills among the student-respondents. The questions in this form of assessment did not cover the specific selected topics in Research 1 for the first grading period but instead, it includes questions dealing with the application of scientific research skills in the daily lives situation. It consists of an eighty-five item test in a multiple-choice and identification type. The said assessment was subdivided into nine parts that represent the different scientific research skills such as: (1) using instructional materials; (2) summarizing; (3) organizing and interpreting data; (4) comparing and contrasting; (5) classification; (6) causal explanation; (7) recognizing experimental variables; (8) generating and testing hypotheses; and (9) analyzing, interpreting and relating the results of experiment. The researcher ensured that the directions are clear and concise to avoid ambiguity among the participants of the study. Each item has four (4) options.

The researcher sought for some discussion and advice coming from the panel of experts for their comments and suggestions. Subsequently, it was shown to the researcher's adviser for comments. All the comments and suggestions were incorporated through in the paper several revisions. The questionnaire on the level of scientific research skills was tried-out to Grade 10 students who have taken up the lessons on scientific research skills. The researcher further validated the questionnaire on the level of scientific research skills through item analysis to test the reliability of the research instrument. Based on this, another revision was done and the final questionnaire was prepared. The validated questionnaire on the level of scientific research skills was administered to the student-respondents to determine the level of scientific research skills.

2.4.2. Constructivist-Based Instructional Enrichment Material

To come up with an effective instructional enrichment material, the researcher followed these steps: First, the researcher used books, magazines, internet, learning competencies and other reference materials that discuss scientific research skills to get some thoughts leading to the procedure in relation to the design how each lesson will be delivered. The said topics include introduction to research, using instructional materials, thinking skills and investigative skills.

Second was the development of the instructional enrichment material. The researcher collected several reference materials related to the development of instructional enrichment material dealing with the enhancement of scientific research skills. A variety of reference materials were used as main references for the design of the constructivist-based instructional material. It includes the implementation of activity, analysis, abstraction, and application (4A's) phases of constructivist approach.

The validation of the instructional enrichment material was accomplished afterwards. At this stage, suggestions, clarifications and a series of discussions with knowledgeable persons and other experts were solicited. Some revisions had been done on the said instructional material to enhance more its contents as well as the appropriate approach in the implementation of constructivism within the teaching-learning process.

The researcher validated the Research 1 instructional enrichment material by requesting time and asking for evaluation from the experts in research and science education. Prior to this, the researcher asked for the approval from the principal of Quezon National High School and head teacher of Science and Technology Department to allow the researcher to consult them in their available time. Comments and recommendations were considered for further improvement of the instructional material. The developed instructional enrichment material was utilized in teaching Research 1 to enhance the scientific research skills among the student-respondents.

2.4.3. Development of the Achievement Test

The researcher constructed a fifty-item multiple-choice achievement test to determine if the developed and validated instructional enrichment material can improve the scientific research skills among the student-participants using constructivist approach. This form of assessment was used as pretest and posttest in order to validate the said learning resources.

The researcher constructed a table of specifications for objective distribution of items among the selected topics in Research 1 based on the course outline for the first grading

period. The first chapter includes the Introduction to Research. This preliminary part of the table of specifications deals with the definition and aims of research, types and kinds of research according to goals and level of investigation, steps in scientific research, guidelines in identifying a good research problem as well as the principles of experimental research.

The second chapter tackles the information about study skills. It includes the use of instructional materials. This covers the use of textbooks, reading for understanding (SQ3R), finding the main idea in a given paragraph, taking down notes and creating a working outline. This chapter also includes organizing and interpreting data. It comprises the skill in reading and constructing graphs, as well as reading and constructing diagrams, tables and charts.

Thinking skills are the highlight for Chapter 3. This chapter is expected to enhance the skill of the students in terms of comparing and contrasting, classifying, causal explanation and interpreting graphic data.

Chapter 4 consists of (1) the use of hypotheses; (2) using experiments as tests of hypotheses; (3) recognizing experimental variables; (4) use of evidence to hypothesize function; (5) achieving adequate controls; (6) analyzing and interpreting experiments; (7) interpreting graphic data; (8) hypothesizing and interpreting data; and (9) interpreting and relating the results of experiment are included in the last chapter. Finally, the questions were distributed according to the three main cognitive objectives namely: knowledge, 20%; comprehension, 30% and application, 50%. The researcher constructed a fifty-item test in a multiple-choice type.

The researcher consulted science teachers and other experts for their suggestions. Afterwards, it was shown to the researcher's adviser for evaluation. Thus, several modifications were followed. The achievement test was tried-out to Grade 10 students of Quezon National High School who have taken up the lessons on scientific research skills. This group of students are not considered to be a part of the research study. Item analysis was done and another revision followed based on this.

2.4.4. Development of the Questionnaire on Level of Acceptability

In order to evaluate the level of acceptability of the said validated learning material in Research 1, the researcher used a Likert scale type questionnaire is simply a statement in which the respondent is asked to evaluate according to objective criteria. It is considered symmetric because there are equal amounts of positive and negative positions. The format of the Likert scale that was be used in data gathering consists of four (4) levels: strongly disagree, disagree, agree and strongly agree.

To evaluate the acceptability of the developed instructional enrichment material, a questionnaire that consists of five criteria was devised. The questionnaire determined the level of agreement of the student-respondents on the acceptability of the instructional material in terms of (1) learning objectives; (2) learning activities; (3) accuracy and clarity of the material; (4) appeal of the material; and (5) usability. The researcher utilized a Likert-type questionnaire that was answered by the pilot sample. Cronbach's alpha was used as the statistical treatment to evaluate the internal consistency of the said instrument for reliability testing. Subsequently, it was shown to the researcher's adviser for some assessment. Thus, several revisions have been made.

2.5. Data Gathering Procedure

The researcher sent a letter asking permission for the validation of the questionnaire, achievement test and instructional enrichment material from the principal of Quezon National High School as well as to the secondary school head teacher. The researcher asked for the authorization of the principal of Quezon National High School for him to administer the questionnaires as well as the instructional enrichment material to the Grade 9 high school students.

Each student was given their own copy of the said research instrument. In addition, the raw scores were determined for assessment and evaluation. Note that the scores of the students on the last part of the questionnaire was multiplied by two since it contains five (5) items only in order to determine the appropriate level of scientific research skills. The researcher explained the purpose of the research study to the student-respondents, prior to the administration of the questionnaire.

The achievement test was taken as the pre-assessment and post-assessment before and after the student-participants used the said learning material. The pretest was answered by the respondents before they utilize the said learning material to evaluate their prior existing scientific research skills. Consequently, the raw scores were collected to be used for the other data gathering procedures. After three (3) months of using the instructional enrichment material, the posttest was answered by the student-participants. The questionnaire that was used in the pretest was also given and served as their posttest. Moreover, the test results were gathered.

Each student-participants was given a hardcopy of the instructional enrichment material. The Research 1 instructional enrichment material was used by the researcher as his main educational material for the whole first grading period. In case that there are some queries from the participants of the study in connection to the instructions provided in each learning phase of constructivist approach integrated in the learning material, they were considered for clarifications. The said learning material was utilized by the researcher as the main resources utilized during the classroom discussion with the integration of constructivist approach. Adding, the material provided different forms of assessment during the instruction in such a way that it presents examples of learning activities that can be utilized for enrichment and in-depth knowledge and concepts on the part of the students. The researcher utilized the said material for the whole duration of the first grading period.

The researcher necessitated the authorization of the principal of Quezon National High School to administer the questionnaire on the level of acceptability of the validated

constructivist learning material among the Grade 9 high school students. Each student-respondent was given a copy of the said questionnaire. Furthermore, their answers were gathered and evaluated to test the acceptability of the said constructivist learning material in Research 1. Hence, the level of agreement among the learners dealing with the developed instructional enrichment material was tested.

3. Results and Discussions

3.1. Level of Scientific Research Skills

The weighted mean distribution on the level of scientific research skills is shown in Table 1. The summary of values demonstrates that the skill in "comparing and contrasting" has the highest value of mean which is 8.14. This mean value is equivalent to highly skilled. This indicates that the participants have learned to a great extent the process of discovering and recognizing the similarities and differences among the properties, events and conditions in the environment. This finding can be attributed to the frequent utilization of several graphic organizers, specifically the Venn diagram, in other academic disciplines that enhance the students in identifying the similarities and differences between two objects or events.

Table 1. *Weighted Mean Distribution on the Level of Scientific Research Skills.*

Scientific Research Skills	No. of Items	Mean	Descriptive Rating
Using Instructional Materials	10	4.82	Moderately Skilled
Summarizing	10	6.11	Skilled
Organizing and Interpreting Data	10	4.15	Moderately Skilled
Comparing and Contrasting	10	8.14	Highly Skilled
Classification	10	3.60	Less Skilled
Causal Explanation	10	3.66	Less Skilled
Recognizing Experimental Variables	10	4.94	Moderately Skilled
Generating and Testing Hypotheses	10	3.42	Less Skilled
Analyzing, Interpreting and Relating the Results of Experiment	10	5.58	Moderately Skilled
Average Weighted Mean		4.94	Moderately Skilled

Lastly, the scientific research skills such as "causal explanation", "classification", and "generating and testing hypotheses" have corresponding mean values of 3.66, 3.60, and 3.42 respectively. The said values correspond to less skilled. Based on this result, these scientific research skills have been the least mastered competencies before the utilization of the constructivist enrichment material particularly in the process of: (1) arranging, grouping or sorting out of things according to some characteristics; (2) explaining an immediate precipitating causes of a particular occurrence; and (3) formulating tentative explanation for certain behaviors, phenomena or events which have occurred or will occur. The said findings can be attributed. The findings may be attributed to the absence of prior existing knowledge among the learners since these skills are not well-utilized as part of the teaching strategy during the instruction from their previous curricular years. However, the mean value for the scientific research skills among the student-respondents is 4.94 which fall under the descriptive rating of moderately skilled.

Killen, R. confirmed the results that the different skills must be enhanced so that learners will acquire prowess in several disciplines to become more prepared and productive in real-world tasks and activities [35]. One of these skills is the scientific research skills. Similarly, Meador, K. stated that individuals need to think creatively to be able to enhance their scientific research skills in order to develop fundamental scientific understanding [39].

3.2. Validation of Constructivist-Based Instructional Enrichment Material

Table 2 reveals the data for testing the differences between the mean scores from pretest and posttest. The findings show that from the 50 items, 21.67 is the mean value for pretest in which its standard deviation is 4.21. On the other hand, the mean value of posttest is equal to 38.71. It has a standard deviation of 5.27. It implies that the standard deviation of the posttest scores are greater than the pretest. It only indicates that the posttest scores are more heterogeneous than the pretest scores.

Table 2. *Test of Difference between the Mean Scores of Pretest and Posttest.*

Test	Highest Score	Lowest Score	No. of Items	M	SD	D	*z*-value	*z*-tab
Pretest	32	10	50	21.67	4.21	17.043	27.085	1.96
Posttest	49	20	50	38.71	5.27			

To test the difference between the mean scores, *z*-test was applied. The computed *z*-value is 27.085 is greater than the critical value of 1.96 with a level of significance of 0.05. Since the z-value is greater than the tabular value, the null hypothesis was rejected. It only indicates that the high scores in posttest may be associated with the use of the constructivist instructional enrichment material in enhancing scientific research skills.

It means that the participants enhanced their scientific research skills through the utilization of the instructional enrichment material in Research 1. This positive outcome may be associated to the essential learning competencies of the said

learning material that are specific, reasonable, achievable and measurable that fosters the capability of the learners. It also includes activities that consider the students' needs and provide real-life examples that facilitate active learning. It only means that the material matches the learners' experiences with respect to the expected learning outcomes. Thus, learners are able to manifest the cognitive and psychomotor domains of the learning objectives in connection to scientific research skills.

Therefore, Mulhayatiah, D. explained that teaching the subject matter effectively may be attributed to the utilization of instructional enrichment material. It was noted that through the use instructional materials using learning modules for instance, these sources can develop the problem-solving skills in the different area of disciplines [41]. Likewise, Buendicho, F. stressed that instructional enrichment materials play a vital role in enhancing the learning outcomes of the students in connection to the educative process [14]. The organization of information and concepts will determine the quality of instruction. Turpin, T. emphasized those students who had scientific research skill training succeeded more than the students who had traditional training [56]. The result shows that enriching the scientific research skills through the use of instructional enrichment material increased the academic achievements of the students. Furthermore, Turpin, T. stated that scientific research skills improve scientific creativity and academic achievement [56].

The results stated above are parallel to the study of Acisli, S. in which it was explained that problems in the learning process dealing with chemistry can be enhanced through constructivist approach in which learners can explore and learn the main concepts of the topic on their own through inquiry method, as well as relating the concepts in everyday lives [2]. Similarly, Manzo, R. pointed out that constructivist approach actively engage students in a continuous stages that help them create their own knowledge and experiences, construct meaning, and evaluate their understanding of new information [38]. The positive result may be associated with the learning objectives of the constructivist-based instructional enrichment material that are specific, measurable, achievable, and reasonable within the ability of the learners. It also includes a wide variety of learning episodes and phases that will solve when it comes to the learners' needs and provide real-life examples that fosters active learning. It only indicates that the learning enrichment material connects the learners' goal about their learning outcomes. Thus, learners are able to understand the difficult topics in relation to scientific research skills.

3.3. Level of Acceptability of the Constructivist-Based Instructional Enrichment Material

Table 3 reveals the responses of the student-participants in relation to the level of acceptability of the constructivist instructional enrichment material in enhancing scientific research skills as to learning objectives. In terms of "the objectives of the learning activities integrates performance and content standard of the learning area", obtained a weighted mean value of 3.59 (strongly agree). It implies in these findings instructional enrichment material consists of learning objectives which are adherent to the benchmark related to the subject matter, specifically in the field of research.

Table 3. *Level of Acceptability of the Constructivist Instructional Enrichment Material in Enhancing Scientific Research Skills in terms of Learning Objectives.*

Statement	SA (4)	A (3)	D (2)	SD (1)	WM	Descriptive Rating
The objectives of the learning activities integrates performance and the content standard of the learning area.	68	47	0	0	3.59	Strongly Agree
The learning goals consist of clarified and specified learning tasks.	62	52	1	0	3.53	Strongly Agree
The learning objectives are specific, measurable and attainable.	45	69	1	0	3.38	Strongly Agree
Learning objectives explicitly integrates values in each activity.	60	54	1	0	3.51	Strongly Agree
Average Weighted Mean					3.50	Strongly Agree

Likewise, the statements "the learning goals consist of clarified and specified learning tasks", "learning objectives explicitly integrates values in each activity", and "the learning objectives in the material were specific, measurable and attainable." have weighted mean values of 3.53, 3.51, and 3.38 respectively. These weighted mean values correspond to "strongly agree". It can be interpreted that the material consists of well-defined learning objectives that can be attained based from the capability of the students. The learning objectives integrate the values to be enhanced by the students specifically, the scientific attitudes. This connotes that the learning goals of the learning material conforms to the major aims of scientific research. The objectives are stated in terms of real-life situations that the teachers intend to achieve. Hence, the learning objectives are specific, reasonable, achievable and measurable.

The overall average weighted mean for the learning objective is 3.50 (strongly agree). It connotes that the instructional enrichment material consists of learning objectives that gives clear, attainable, and specific learning tasks with the inclusion of values that satisfies the most essential learning competencies of the said learning area.

It was confirmed that the characteristics of a good instructional material that the objectives must be properly and logically sequenced, specific, observable, measurable and attainable. Bebell, D. stressed that the effectiveness of instructional materials depends upon the manner and the degree to which they meet the needs of teachers and students based on the learning objectives [9].

Table 4 reveals the weighted mean values for the level of acceptability of the instructional enrichment material in in terms of learning activities of the materials. The obtained

mean values for the first eight (8) items range from 3.17 to 3.64 which got a descriptive rating of "strongly agree."

The respondents strongly agree on the statement that "activities were designed to develop scientific research skills". This response indicates that the students learned scientific research skills since the instructional enrichment material allows them to combine knowledge, competencies and skills that requires them to use when performing tasks in genuine professional situations.

Table 4. *Level of Acceptability of the Constructivist Instructional Enrichment Material in Enhancing Scientific Research Skills in terms of Learning Activities.*

Statement	SA (4)	A (3)	D (2)	SD (1)	WM	Descriptive Rating
The learning activities were designed to develop scientific thinking skills.	76	37	2	0	3.64	Strongly Agree
The learning activities were arranged in a spiral approach.	54	61	0	0	3.47	Strongly Agree
The learning activities were placed in a systematic arrangement.	69	45	1	0	3.59	Strongly Agree
The learning activities follows meaningful connection to other concepts.	47	66	2	0	3.59	Strongly Agree
The learning activities designed to enhance the motivational skills.	54	61	0	0	3.47	Strongly Agree
The learning activities were designed to enhance higher order thinking skills	52	60	3	0	3.43	Strongly Agree
The learning activities can be integrated in daily activities.	52	60	3	0	3.43	Strongly Agree
The learning activities can address the needs of the learners.	43	71	1	0	3.37	Strongly Agree
The activities can be understood easily.	27	81	6	1	3.17	Agree
The learning activities develop the affective domains of learning.	27	86	2	0	3.22	Agree
Average Weighted Mean					3.42	Strongly Agree

The instructional material consists of "learning activities were placed in a systematic arrangement" and "learning activities were arranged in a spiral approach". This may be attributed to the proper sequencing of lessons of the instructional enrichment material are organized from simple to complex materials.

The material also includes "learning activities designed to enhance the motivational skills". It signifies that it facilitates effective learning process since the material provides a number of ways to enhance the active involvement of the learners in the teaching-learning process. The constructivist instructional enrichment material consists of "learning activities were designed to enhance higher order thinking skills".

The material also contains "learning activities can be integrated in daily activities" since it contains tasks which are classified as complex but require a significant period of exploration that can be found in the last chapter of the material that includes the investigative processes.

The material also contains "learning activities follows meaningful connection to other concepts." It obtained a weighted mean value of 3.39 that corresponds to "strongly agree". Adding, "learning activities can address the needs of the learners". This indicates that there is an integration of collaborative approach dealing with the team-work skills that are commonly considered as an important learning outcome in all learning areas.

On the other hand, the students agreed that "the activities were understood easily by students" and "learning activities develop the affective domains of learning". These criteria obtained the lowest weighted mean of 3.17 and 3.22 respectively. These weighted mean values fall under the descriptive rating of "agree". This connotes that there are some instructions in the material that must be simplified in order to avoid confusions on the part of the students. Lastly, some learning activities in the material should be further enhanced to include more the integration of scientific attitudes and values.

The variable dealing with learning activities of the constructivist enrichment learning material has a weighted mean value of 3.42. It corresponds to a rating of "strongly agree." It can be interpreted based from the findings that the material fosters self-regulating, independent, and active learning. Furthermore, it facilitates the enhancement of scientific research skills among the learners.

Table 5. *Level of Acceptability of the Constructivist Instructional Instructional Enrichment Material in Enhancing Scientific Research Skills as to Accuracy and Clarity of the Material.*

Statement	SA (4)	A (3)	D (2)	SD (1)	WM	Descriptive Rating
The instructional material provides systematic arrangement of topics to support understanding of the topics.	44	70	1	0	3.37	Strongly Agree
The instructional material consists of a variety of learning opportunities to achieve the mastery of the lesson.	39	74	2	0	3.32	Strongly Agree
The instructions of the enrichment material are clear and well-defined.	43	67	5	0	3.33	Strongly Agree
The content of the instructional material shows a detailed and creative craftsmanship.	42	71	2	0	3.38	Strongly Agree
The learning activities of the instructional material shows logical arrangement and strong connection to the past lessons.	52	61	2	0	3.43	Strongly Agree
Average Weighted Mean					3.37	Strongly Agree

Bukoye, R. stated that instructional materials should stimulate students' interest, enrich students' experience, make learning meaningful and develop mental imagery as well as observation and generalization [15]. Adding, Abrantes G. stressed that students' interest reflects input into the course, such as attention level in class, interest in learning the material, perception of a course's intellectual challenge, and acquired competence in the field. Students'

interest facilitates effective teaching and creates a more favorable learning environment [1].

The level of acceptability of the constructivist instructional material based from accuracy and clarity was shown in Table 5. The mean values range from 3.32 to 3.43 which got a descriptive rating of strongly agree.

In terms of "the learning activities of the instructional material shows logical arrangement and strong connection to the past lessons," it garnered a weighted mean value of 3.43. This significant result may be attributed to the flow of the lesson content that has coherence, logical arrangement, and follows the notion of meaningful learning. Adding, "the content of the instructional material shows a detailed and creative craftsmanship." obtained 3.38 as its weighted mean value. It can be attributed to use of the graphic organizers that include diagrams with words, charts, tables and other forms of graphs that are said to be present in the second chapter of the material that includes organizing and interpreting data.

The instructional material provides systematic arrangement of topics to support understanding of the topics. It obtained a weighted mean value of 3.37. It only means that the material helps the students understand the relationships between topics and make connections between what is taught and their own experiences. The material also consists of "instructions that are clear and well-defined" and "the instructional material consists of a variety of learning opportunities to achieve the mastery of the lesson" 3.33 and 3.32 respectively as the weighted mean values. It indicates that the instructional enrichment material contains instructions that aim to develop more complex explanations and deeper understanding of lessons when they work together with peers. Adding, it integrates interdisciplinary perspective since it contains knowledge of multiple disciplines such as biology, chemistry, physics and mathematics.

Overall, these results connote that the instructional enrichment material delivers such contents that are well-defined with systematic and logical arrangement. Thus, the instructional enrichment material presents a wide variety of concepts that are linked to preceding topics and lessons.

This result corresponds to the study of Mulhayahtiah, et al. that through the use instructional materials like learning modules, learners can enhance the problem-solving skills across different learning areas [41]. In addition, Green, F. pointed out also that students need to see patterns with respect to the connection to enable the brain make its own meaning of ideas and skills since it cannot effectively retain lots of unconnected facts [27].

Table 6. *Level of Acceptability of the Constructivist Instructional Enrichment Material in Enhancing Scientific Research Skills in terms of Appeal of the Material.*

Statement	SA (4)	A (3)	D (2)	SD (1)	WM	Descriptive Rating
The material's lessons captured my own interest.	34	79	2	0	3.28	Strongly Agree
The exercises' layout established my comfort and motivation.	34	80	1	0	3.29	Strongly Agree
The material provided varied benefit to my own learning capacity.	58	57	0	0	3.50	Strongly Agree
The material stimulated my interest toward learning the lessons.	54	59	2	0	3.45	Strongly Agree
The information from the instructional material enhances the higher order thinking skills.	60	53	2	0	3.50	Strongly Agree
Average Weighted Mean					3.40	Strongly Agree

Table 6 reveals the results for the appeal of the constructivist instructional enrichment material. The statements for this variable obtained weighted mean values ranging from 3.28 to 3.50 with descriptive ratings of "strongly agree."

When it comes to "the information from the instructional material enhances the higher order thinking skills" and "the instructional material gives varied benefit to the learners' capability", both criteria received a weighted mean value of 3.50. This indicates that the learning material developed and enhanced the higher order thinking skills of the students. In addition, it also supports the students in achieving a wide variety of desired learning outcomes.

The learning material also "developed the learners' motivational skills in learning the topics". This statement obtained a mean value of 3.45 since the students were observed that they show their readiness and enthusiasm for the next lesson. The same thing with the other criteria for the appeal of the material to the target users such as "the layout of exercises facilitates motivation and comfort in the learning process" and "the material's lessons captured my own interest". These criteria have weighted mean values of 3.29 and 3.28 respectively. These results can be attributed to the integration of the different elements of multimedia learning materials that includes, images, graphics, appropriate font styles, colors, shapes, and texts for the instructional material.

The level of the acceptability of the material in terms of its appeal to the target user is 3.40. This numerical value corresponds to the rating of "strongly agree". This result reveals that the instructional enrichment material provide a wide-ranging advantages in the learning outcomes when it comes to the learners driven by their own enthusiasm and eagerness to participate in the educative process that activates their problem solving and critical thinking skills.

This positive result confirms from the study of Amalia, S. and Wuryandani, W. in which it was revealed that the utilization of instructional enrichment material enhances the problem solving and critical thinking skills [5]. Moreover, Bukoye, R. stressed that instructional enrichment material must be enhanced through several forms of media such as charts, graphs, maps and still images [15]. These features enhanced the interest and motivation of the students in learning the subject matter. Tomlinson, C. suggested that when teachers assign work, it should be equally interesting, equally appealing and equally focused on essential understandings and skills [54].

The acceptability level of the instructional material in terms of usability was shown in Table 7. The rating of 3.29 to 3.64 refers to the weighted mean values that were obtained from the different statements. These values correspond to the descriptive rating of strongly agree.

The instructional enrichment material includes the criterion "effective learning occurs when it is related to the learners' capability" as evident on the weighted mean of 3.64. It means that students acquire knowledge if the learning tasks are said to be within their learning capacity. The same thing with the criterion "instructional enrichment materials improved my scientific research skills", it has a weighted mean of 3.55. Most likely, it is attributed to the characteristics of the instructional enrichment material since it presents the lessons about scientific research skills that contain pre assessments, discussions, activities and chapter reviews.

Table 7. *Level of Acceptability of the Constructivist Instructional Enrichment Material in Enhancing Scientific Research Skills in terms of Usability of the Material.*

Statement	SA (4)	A (3)	D (2)	SD (1)	WM	Descriptive Rating
The material helped me gain satisfaction in learning scientific research skills.	54	59	2	0	3.43	Strongly Agree
The use of instructional enrichment material as an aid in enhancing scientific research skills made each lesson initiates engagement and enthusiasm in learning.	47	64	4	0	3.37	Strongly Agree
The learning materials enhances my own purpose and self-esteem in conducting research activities.	36	76	3	0	3.29	Strongly Agree
The instructional enrichment materials create strategies on my part to apply the acquired knowledge and skills at my own pace.	55	57	3	0	3.45	Strongly Agree
The material initiated my curiosity and eagerness to learn scientific research skills.	51	61	3	0	3.42	Strongly Agree
The instructional material assisted me to acquire active involvement in each learning episodes.	56	55	4	0	3.45	Strongly Agree
Instructional enrichment materials as tool for learning improved my study habits.	51	60	4	0	3.41	Strongly Agree
Effective learning occurs when it is related to the learners' capability.	75	39	1	0	3.64	Strongly Agree
With the aid of instructional enrichment materials, I gained self-confidence in conducting research activities.	50	64	1	0	3.43	Strongly Agree
Instructional enrichment materials improved my scientific research skills.	65	48	2	0	3.55	Strongly Agree
Average Weighted Mean					3.44	Strongly Agree

The statement that "the instructional material assisted me to acquire active involvement in each learning episodes" (3.45, WM). This finding indicates that it increases the students' achievement. The "instructional enrichment materials create strategies on my part to apply the acquired knowledge and skills at my own pace" (3.45, WM). It only shows that the instructional enrichment material develops the students' responsibility in terms of time management in learning.

The "material helped me gain satisfaction in learning scientific research skills" (3.43 WM); "with the aid of instructional enrichment materials, I gained self-confidence in conducting research activities." (3.43 WM); the "material initiated my curiosity and eagerness to learn scientific research skills." (3.42 WM); and "instructional enrichment materials as tool for learning improved my study habits" (3.41 WM).

The statement about the use of instructional enrichment material as an aid in enhancing scientific research skills made each lesson initiates engagement and enthusiasm in learning garnered a weighted mean of 3.37. It only indicates that students show strong motivation as they utilize the material. Hence, it energizes, directs and sustains behavior that ultimately leads to higher achievement in the classroom. Lastly, "the learning materials enhances my own purpose and self-esteem in conducting research activities" obtained a mean value of 3.29. It only means that the students are observed to be wide-eyed and are eager to be involved in any learning activity. All of these items under the criterion usability have a descriptive rating of "strongly agree."

The level of acceptability of the material as to usability is 3.44. It falls under the descriptive rating of "strongly agree". It can be inferred that the instructional enrichment material helps the students to learn scientific research skills since it provides a variety of learning activities that fit to their abilities. It only means that it improves the study habits and active involvement of the students in their own pace.

The positive result conforms to the study of Zainuri, et al. that emphasized that the instructional materials must depend on the learners' capability hence; many individuals will participate actively with the use of varied learning materials [57]. Also, Dargo, J. and Dimas, M. confirmed that upon the use of the material, the learners monitor their learning progress through self-regulating process [20].

4. Conclusion

In the light of the findings, it can be inferred that he student-respondents need intervention materials to improve their scientific research skill especially those who are less skilled and moderately skilled. The developed constructivist-based instructional enrichment material in Research 1 is ready for adoption and is a valid tool in enhancing scientific research skills among the learners. It indicates that constructivist approach within the classroom setting was established since the students learned from the experiences in constructing their own concepts. Students can discover the new concepts derived from the activities that were concretized. Hence, they can explain well the concept based from the observations that they made through the series of activities. Lastly, the said learning material is commendable for use since the learning objectives are specific, measurable, and attainable on the part of the learners. Moreover, the

contents of the learning material have appropriate learning activities that can address the learners' needs. Lastly, its content has accuracy, clarity, appeal and usability among the target users.

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