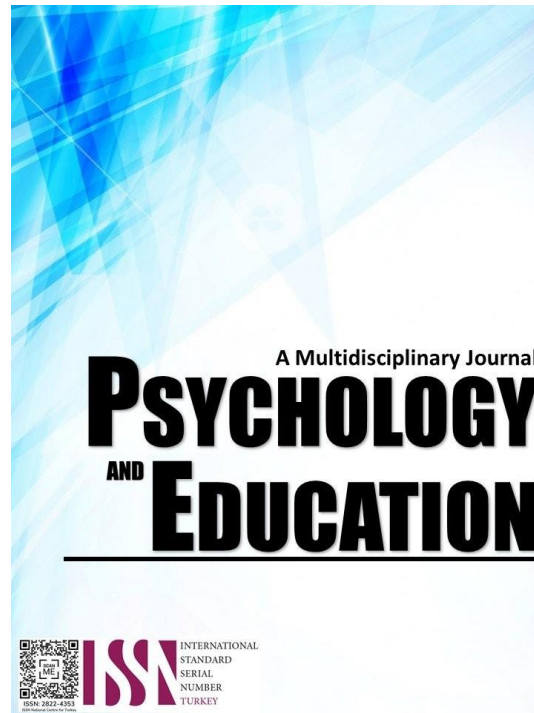


**PROCESS SKILLS-BASED INSTRUCTIONAL  
MATERIALS TOWARDS AN ENHANCED  
STUDENTS PERFORMANCE IN  
SCIENCE 7 (PHYSICS)**



**PSYCHOLOGY AND EDUCATION: A MULTIDISCIPLINARY JOURNAL**

2023

Volume: 12

Pages: 708-718

Document ID: 2023PEMJ1097

DOI: 10.5281/zenodo.8274863

Manuscript Accepted: 2023-22-8

## Process Skills–Based Instructional Materials Towards an Enhanced Students Performance in Science 7 (Physics)

Elmerlyn A. Dionisio\*

*For affiliations and correspondence, see the last page.*

### Abstract

This study aimed to determine the effectiveness of process skills - based instructional materials (PSBIM) in enhancing the process skills and performance of grade 7 students in Science 7(Physics) at Montalban Heights National High School for the School Year 2022-2023. This study used both descriptive and experimental research methods. The developed process skills- based instructional materials in Science 7 (Physics) were rated as Strongly Agree by the Science Teachers and Experts with an overall weighted mean of 3.67 and 3.66, respectively, in terms of content, format, layout and design, accuracy and up- datedness of information. Also, there was no significant difference in their evaluation. In addition, the student respondents got a weighted mean score of 17.78 in the pretest while 33.48 in the posttest, with a mean difference of 21.54 and showed no significant difference between their performance. Comments and suggestions were provided by the respondents to further improve the instructional materials.

**Keywords:** *instructional materials, process skill-based, physics*

### Introduction

Science Education seeks to cultivate in students a scientific literacy that will enable them to become informed, active citizens capable of making decisions about the use of scientific knowledge that could have an impact on their social, physical, or environmental well-being as mentioned by the Department of Education's conceptual framework for Science Area. The scientific curriculum recognized the importance of Technology and Science in everyday human concerns. Science and Technology were intertwined with the social, economic, emotional, and ethical dimensions of life. To safeguard our country's cultural heritage, the scientific curriculum promoted a tight interaction between Science and Technology, particularly Indigenous Technology.

The K-12 Science Curriculum is an inquiry-based and learner-centered, with an emphasis on using evidence to generate explanations. Concepts and abilities in the life Sciences, Physics, Chemistry, and Earth Sciences are taught at progressively higher levels of complexity from one grade level to the next in a spiral development, providing for a deeper understanding of fundamental ideas. The incorporation of Science issues and other disciplines led to a better comprehension of concepts and its application to real-world settings.

Education has been significantly impacted by the COVID-19 pandemic, which has now affected worldwide health. Economically, socially, and politically, the COVID-19 pandemic has presented unique obstacles on a global scale. It has led to a

problem that extends beyond health care—a catastrophe in education. In order to implement responsive and preventative measures, the Department of Education developed a resilient learning system using data that is based on needs and evidence.

Through the Basic Education Learning Continuity Plan 2020, the Department of Education (DepEd) addressed the issues on Basic Education (BE-LCP). One of the learning modalities that the agency used in the so-called New Normal in education was the modules. The developed learning modules catered students who do not have access to the internet. The modules were based on the Most Essential Learning Competencies (MELC) prepared by the supervisors and experts. Most students considered Science as a gritty yet interesting subject. Students find it difficult to learn because of the concept which were abstract and required critical thinking skills, problem-solving strategies, scientific processes, and reasoning skills. Science is a discipline that is packed with ideas and information. It is the ideal subject to use as a knowledge bank to address students' interests because of the constantly curiosity and eagerness to learn new things. In order for students to be able to apply each concept in real-world situations, teachers must make sure that students fully understand the principles of each area.

Science process skills are necessary for students to understand more about the fields of Science and Technology. One of the 21st-century abilities that students should have in order to navigate the challenges of the Science and Technology sectors and to maintain the competitiveness throughout the

globalization era is the ability to master scientific process skills.

Process skills are set of abilities used in scientific activities. Students with science process skills participated actively in a learning process. On the other hand, Process skills assisted students in grasping essential science concepts, understanding the nature of science, realizing the importance of Science and Technology in their lives, and deciding to continue Science studies in school. It's essential to develop fundamental process skills in addition to developing proper values and attitudes toward science. In order to teach students on how to think like scientists, Science Education should place a strong emphasis on helping students develop the attitude that the successful scientists were able to exhibit (Opulencia, 2011). Today, it plays an essential role to shape students' attitudes, behaviors, and motivations because kids will be unprepared for the difficulties that they and their world will confront if these broader abilities and capacities are not developed. Miller (2017).

As a science teacher, the researcher aimed to help the students to obtain a thorough understanding of the least mastered skills. Her concern for the welfare of the students was to identify the process skills in science 7 (Physics) relative to the science concept which led the researcher to pursue this study.

The researcher, decided to create the process-skills-based instructional material. She believed that by using instructional learning tools, teachers of science subjects would be able to teach more effectively. Creating instructional materials is extremely important for the future enhancement of the teaching and learning process. In addition, the researcher believed that the study would aid in the resolution of the problem. The school must provide appropriate educational resources for Intervention to deal with topics which are not well understood. Finally, the researcher strongly believes that the use of Instructional Learning Materials improves the student's performance in science 7(Physics) is necessary. With the aforementioned premises, the researcher found the need to conduct the study to identify the process skills of grade 7 students and propose instructional materials to enhance students' performance in Science 7 (Physics) to aid in combating the difficulties perceived by the students.

### Research Questions

This study focused on the development and validation of process skills-based instructional materials in

science 7 (Physics) at Montalban Heights National High School during the school year 2022-2023. Specifically, it sought to answer the following questions:

1. What is the evaluation of the science teachers and experts on the developed process skills- based instructional materials in terms of the following criteria?
  - 1.1 Content;
  - 1.2 Format;
  - 1.3 Layout and Design; and
  - 1.4 Accuracy and Up-datedness of Information?
2. Is there a significant difference in the evaluation of the two groups of respondents on the developed process skills-based instructional materials based on the above-mentioned criteria?
3. What is the performance of the student respondents before and after using the process skills-based instructional materials?
4. Is there a significant difference in the performance of students before and after using the process skills-based instructional materials?
5. What is the level of process skills of the Grade 7 students before and after using process skills-based instructional materials in terms of the following
  - 5.1 Observing;
  - 5.2 Classifying;
  - 5.3 Measuring;
  - 5.4 Predicting;
  - 5.5 Interpreting; and
  - 5.6 Communicating?
6. What are the comments and suggestions of the two groups of respondents to improve the developed process skills-based instructional material?

### Literature Review

According to Kramer et al. (2019), giving science process skills specific attention in the classroom results in improvements in the skills themselves as well as a startlingly better comprehension of the subject matter. In addition, he added that since biological questions are at the core of scientific investigation, students must learn how to formulate and respond to significant biological inquiries. The capacity to develop hypotheses, plan experiments, evaluate data, draw conclusions, and convey findings are just a few of the fundamental abilities that students must master to achieve this goal. These are referred to as "science process skills.

Science process skills are one of the most significant abilities that every student should have since they are

utilized in everyday life and have an impact on personal, social, and individual lives in the global community (Siregar et. al., 2020). They are inextricably linked to the conceptualization of learning and the practical application of science (Harlen, 1999a). Depending on the nature of the subject and problem, students can model, observe, experiment, or research (Choirunnisa et al., 2018).

Science process skills are process thinking abilities that are based on scientific methods and techniques. Scientific process skills are essential for everyone because they are almost always used in everyday life. There are two categories of process skills used in science instruction: Basic science process skills include observing, classifying, inferring, measuring, communicating, and predicting, whereas integrated process skills include identifying variables, constructing hypotheses, tabulating, and graphing data, defining variables, designing investigations, and experimenting. (Safaah, Sekar & Muslim, Muslim & Liliawati, Winny 2017).

On the other hand, According to Bukoye (2019), every subject in the school curriculum requires the use of instructional materials as a learning tool. They give the students the opportunity to interact with words, symbols, and concepts in ways that enhance their reading, listening, problem-solving, viewing, and thinking skills as well as their speaking, writing, and media and technology-using abilities.

Abadi, M. K. et al., (2017) defined instructional materials as any item used by teachers to carry out teaching and learning activities in the classroom. To increase students' interest in learning, teaching materials should be interesting, appealing, and effective when used for a specific learning goal. In addition to teaching materials, articles, designs, and patents in the fields of science, technology, art, and sports should be included.

Meanwhile, Taylor (2019) points that teachers must use relevant data and assessment information as a guide to identifying critical factors such as reading level, mathematics ability, and so on. These data points enable teachers to create resources that elevate or enhance learning without creating an overly difficult level of difficulty. Enrichment must be tailored to each learner's abilities. Teachers can see how to effectively group students for enrichment activities using assessments to determine reading levels or math grade-level proficiency. When students are paired or grouped based on these data points, they can work collaboratively with other students who

share similar interests and abilities. Student preferences should be considered when planning enrichment activities. This means that while each enrichment program should focus on a comparable learning objective, the method by which students attain that objective can vary significantly based on their interests or preferences. It is important for enrichment to draw on existing knowledge and/or consider linkages between disciplines.

One of the studies that are related to the present study was conducted by Marces (2015). To achieve its main goal, the study used quasi-experimental research to create and use supplemental enrichment learning resources to help students at Mayamot National High School improve their performance in Physics 7. Based on the findings, the following conclusions were drawn: (1) the developed enrichment learning materials are well prepared and acceptable to science teachers and department heads, and (2) he developed instructional learning materials in Physics 7 are effective and have improved the student's performance in the selected least mastered topics.

In Glova's (2020) study on "Effectiveness of Experiential-Based Enhancement Materials in General Physics", the developed experiential-based enhancement materials were based on the first five least mastered skills or learning competencies in General Physics based on the results of the midterm and final examinations for the school year 2018-2019. The study revealed that the developed experiential-based enhancement materials in Physics 7 were an effective instrument for the teaching-learning process.

Magdasoc (2016) investigated the "Effectiveness of Electronic-Based Strategy in Teaching Science: A Classroom Ethnography." She used head teachers and science teachers as respondents, who evaluated students' science process skills while using the said strategy. With a mean rating of 4.44 and 4.54, respectively, both head teachers and science teachers agreed that the lesson included scientific skills and processes and that the strategy was appropriate. She also discovered that by employing the strategy, the student's performance improved.

## Methodology

This study used both descriptive and experimental research methods to achieve its main goal, which was to develop process skills-based materials in science 7 (Physics). The researcher used the descriptive method to identify the levels of process skills that developed

into process skills-based instructional material. As mentioned by McCombes (2019), descriptive research seeks to describe a population, situation, or phenomenon precisely and thoroughly. It answers questions about what, where, when, and how, but not why. According to Calmorin (2016), the descriptive method focuses on the present situation with the purpose of finding the truth. The researcher used the experimental method to validate the developed process skills-based instructional materials in Physics 7 based on the results of the pretest and posttests. As stated by (Calmorin, 2016), experimental method focused the study on the future when the variables were carefully controlled or manipulated.

### Participants of the Study

This study was conducted at Montalban Heights National High School in cluster ROS of the Division of Rizal during the school year 2022-2023. Purposive sampling was employed by the researcher in determining the respondents of this study. The sources of data were 50 grade seven students, 30 Science Teachers, and 35 Experts who were from different schools. The experts are Master Teacher in Science Area or Head Teacher in their school.

The distribution of respondents was from senior and junior high school teachers and experts of cluster Rodriguez and San Mateo within the Division of Rizal, Division of Marikina, and Division of Quezon City. This study used purposive sampling to select the school because it was convenient and easy. The respondents were readily available. The science teachers are junior high school science teachers who are non-physics majors but have taught any science subject for at least three years. They were considered the first group of respondents of this study. The experts are science teachers who are either unit holders of M.A.T in Science or a graduate of M.A.T in Science or other related specialization. Thirty-five experts from junior or senior high schools who currently hold a master teacher, or a head teacher position were taken into consideration as the second group of respondents or the experts.

### Instruments of the Study

The instruments used in the study were the test questionnaires. The first questionnaire was for the students utilized to the process skills of students in Science 7. The test questionnaires were prepared by the researcher and checked by the adviser. The second questionnaire was used to determine the teacher and expert respondents' opinions on the development of

instructional materials. It was adapted and modified from the Department of Education's Guidelines and Processes for LRMS Assessment and Evaluation and submitted to the researcher's adviser and critic for feedback. To determine its acceptability, the developed process skills-based instructional materials were evaluated using the following criteria: (a) content, (b) format, (c) layout and design, and (d) accuracy and up-to-datedness of information.

### Procedure

First, the researcher sought permission from the School Division Superintendent of Marikina, Quezon City, and Rizal. Then, she asked permission from the school principal to conduct the study. The process skills-based instructional material was based on the results of the identified process skills.

The preparation stage included identifying the process skills in Science 7 (Physics) for the academic year 2022-2023. The enhancement phase included the following sub-stages determining the presentation of the topic of instructional materials, the process of writing the instructional material, and the preliminary revisions that required to enhance the initial plans of the instructional materials.

After the approval, the researcher proceeded with the evaluation phase or the administration of the questionnaires. The process skills survey questionnaire was a researcher-made test composed of six process skills with five indicators to determine the level of process skills of the students before and about.

In the validation stage, teachers, who were handling science and with master or head teacher positions were requested to validate the test questionnaires and instructional materials in terms of content, format, layout and design, accuracy, and up-to-datedness of information. The questionnaires were administered and retrieved by the researcher. Modifications suggested by the experts and science teachers were integrated into the reproduction of the final copy of instructional materials.

The preliminary evaluation of the developed instructional material was achieved using one group experimental design. The pretest was administered to the students before asking them to use the developed instructional materials after which the posttest was administered. The instructional materials were utilized by grade 7 students from Montalban Heights National High School. After retrieving the test questionnaire, the researcher tabulated, analyzed, and interpreted the results of the test using the appropriate statistical treatment.



### Ethical Considerations

The participants may not be harmed in any way as a result of their participation in this study. Prior to the study, full consent was obtained from the participants, the students, the teachers and experts. Furthermore, the privacy of the research participants was protected. The voluntary participation of respondents in the study was valued, and they had an option to withdraw from the study at any time.

A sufficient level of confidentiality was maintained when handling the data, and any false information or biased representation of primary data findings was avoided. On the other hand, maintaining the highest level of objectivity in discussions and analyses had been taken into account throughout the research. Furthermore, any affiliations, funding sources, and potential conflicts of interest were disclosed.

### Results and Discussion

#### Topics in Science 7 (Physics) for the Development of Process Skills-Based Instructional Materials

It can be gleaned from the table the topics that were taken up during the third quarter during the school year 2022-2023. These topics were grouped into modules which were developed into PSBIM. Topics such as Motion (Distance, Displacement, Speed, Velocity and Acceleration) appear in the first module, the second module include Waves (Transverse and Longitudinal Waves), the third module consists of topics about Sound, the fourth module consist of Electromagnetic Spectrum, fifth module includes topics about modes of heat transfer, and the sixth module consist of topics about Electricity.

Table 1. *Topics in Science 7*

<i>Module</i>	<i>Topics</i>
1	Motion
2	Wave
3	Sound
4	Electromagnetic Spectrum
5	Heat
6	Electricity

These topics were also used in developing the pretest and posttest to determine the effectiveness of developed process skills-based instructional materials.

#### Evaluation of the Science Teachers and Experts of the Developed Process Skills-Based Instructional Materials

Table 2. *Evaluation of the science Teachers and Experts Respondents of the Developed Process Skills-Based Instructional Materials in terms of Content*

<i>Content</i>	<i>Science Teachers</i>		<i>Expert</i>	
	<i>WM</i>	<i>VI</i>	<i>WM</i>	<i>VI</i>
1. Content is suitable to the student's level of development and covered the targeted Learning Competencies.	3.7	VS	3.71	VS
2. Material contributes to the achievement of specific objectives of the subject area.	3.83	VS	3.74	VS
3. Material provides for the development of higher cognitive skills such as Observing Skills, Classifying Skills, Measuring Skills, Predicting Skills, Interpreting Skills and Communicating Skills.	3.63	VS	3.60	VS
4. Material is appropriate to the grade level for which it's intended.	3.77	VS	3.77	VS
Average Weighted Mean	3.73	VS	3.71	VS

It can be gleaned from the table that all items were rated as Very Satisfactory by the science teachers and experts in terms of content of the developed process skills-based instructional material in Physics 7 with an average weighted mean of 3.73 and 3.71 respectively.

This indicates that the science teachers and experts believed that the developed process skills-based instructional materials (PSBIM) covered the targeted learning competencies which was suited to grade 7 students. It also shows that the content of PSBIM is attainable.

It can be gleaned from the table 3 that the two groups of respondents perceived the developed process skills-based instructional material (PSBIM) as Very Satisfactory with average weighted means of 3.74 and 3.76 by the science teachers and experts, respectively.

This shows that the science teachers and experts believed that the developed process skills-based instructional materials (PSBIM) have text with appropriate size and easy to read, use illustrations and pictures that are simple and appealing, emphasize important concepts, and catch the learners' attention.



Table 3. Evaluation of the Science Teachers and Experts Respondents of the Developed Process Skills-Based Instructional Materials in terms of Format

Format	Science Teachers		Expert	
	WM	VI	WM	VI
1. Prints				
a. Size of letters is appropriate to the intended user.	3.77	VS	3.91	VS
b. Material provides for the development of higher cognitive skills such as Observing Skills, Classifying Skills, Measuring Skills, Predicting Skills, Interpreting Skills and Communicating Skills.	3.77	VS	3.80	VS
c. Font is easy to read.	3.73	VS	3.94	VS
d. Printing is of good quality (i.e., no broken letters, even density, correct alignment, properly placed screen registration).	3.80	VS	3.71	VS
Average Weighted Mean	3.77	VS	3.84	VS
2. Illustrations				
a. Simple and easily recognizable.	3.83	VS	3.74	VS
b. Clarify and supplement the text.	3.60	VS	3.69	VS
c. Properly labelled or captioned (if applicable)	3.67	VS	3.66	VS
d. Realistic / appropriate colors.	3.77	VS	3.74	VS
e. Attractive and appealing.	3.73	VS	3.6	S
Average Weighted Mean	3.72	VS	3.71	VS
Overall Average Weighted Mean	3.75	VS	3.76	VS

Table 4. Evaluation of the science Teachers and Experts Respondents of the Developed Process Skills-Based Instructional Materials in terms of Layout and Design

Layout and Design	Science Teachers		Expert	
	WM	VI	WM	VI
1. Instructional Material has learning objectives that are anchored on the MELC	3.80	VS	3.74	VS
2. Instructional Material uses a variety (at least 3) of self-directed techniques, learning task and formative assessment.	3.87	VS	3.71	VS
3. Instructional Material has content that is logically developed and organized.	3.73	VS	3.63	VS
4. Instructional Material contains essential instructional design elements that contribute to the achievement of learning objectives.	3.77	VS	3.71	VS
5. Attractive and pleasing to look at.	3.70	VS	3.57	VS
6. Simple	3.87	S	3.83	VS
Average Weighted Mean	3.79	VS	3.70	VS

The data reveal that all items were rated as Very

Satisfactory by the Science teachers and experts in terms of content of the developed process skills-based instructional material in Physics 7 with average weighted means of 3.79 and 3.70 respectively.

This implies that the layout and design of the developed process skills-based instructional materials is well organized, and the arrangement of pictures and illustrations were simple and attractive.

Table 5. Evaluation of the science Teachers and Experts Respondents of the Developed Process Skills-Based Instructional Materials in terms Accuracy and Up-to-datedness of Information

Accuracy and Up-to-datedness of Information	Science Teachers		Expert	
	WM	VI	WM	VI
a. Conceptual errors.	3.57	VS	3.66	VS
b. Factual Errors.	3.60	VS	3.71	VS
c. Grammatical errors.	3.60	VS	3.51	VS
d. Computational errors.	3.73	VS	3.74	VS
e. Obsolete information.	3.70	VS	3.80	VS
f. Typographical and other minor errors	3.53	VS	3.46	S
Average Weighted Mean	3.62	VS	3.65	VS

It can be gleaned from table shown that all items were rated as Very Satisfactory by the science teachers and experts in terms of accuracy and up-to-datedness of information of the developed process skills-based instructional material in Physics 7 with average weighted mean of 3.62 and 3.65 respectively.

This finding concurred to the idea that the localized enrichment material was rated as strongly agree in terms of accuracy and up-to-datedness of information.

Test of Significant Difference in the Evaluation of the Two Groups of Respondents on the Four (4) Criteria of the Developed Process Skills - Based Instructional Materials

Table 6. Test of Significant Difference in the Evaluation of the Two Groups of Respondents of the Developed Process Skills - Based Instructional Materials in terms of Content

Respondents	Items	Weighted Mean	Standard Deviation	Computed t-value	Tabular t-value at 0.05, 4 df	D	I
Science Teachers	4	3.73	.35	0.21	2.13	Accept Ho	NS
Experts	4	3.71	.41				

The data reveal that the computed t-value of 0.21 is



less than the tabular t-value of 2.13 at 0.05 level of significance and 4 degrees of freedom. Therefore, the null hypothesis is accepted. Furthermore, there is no significant difference between the evaluations of the two groups of respondents in terms of content of the process skills-based instructional materials.

This implies that the Science teachers and experts have the same perception about the content of the developed process skills-based instructional materials in Science 7(Physics).

Table 7. Test of Significant Difference in the Evaluation of the Two Groups of Respondents of the Developed Process Skills - Based Instructional Materials in terms of Format

Respondents	Items	Weighted Mean	Standard Deviation	Computed t-value	Tabular t-value at 0.05, 4 df	D	I
Science Teachers	4	3.74	.28	0.27	2.13	Accept Ho	NS
Experts	4	3.76	.31				

It can be gleaned from the table that the computed t-value of 0.27 was less than the tabular t-value of 2.13 at 0.05 level of significance and 4 degrees of freedom. Therefore, the null hypothesis is accepted. Furthermore, there is no significant difference between the evaluations of the two groups of respondents in terms of content of the process skills-based instructional materials.

This implies that the science teachers and experts have the same perceptions about the format of the developed process skills-based instructional materials in science 7(Physics).

Table 8. Test of Significant Difference in the Evaluation of the Two Groups of Respondents of the Developed Process Skills - Based Instructional Materials in terms of Layout and Design

Respondents	Items	Weighted Mean	Standard Deviation	Computed t-value	Tabular t-value at 0.05, 4 df	D	I
Science Teachers	4	3.79	.23	1.10	2.13	Accept tHo	NS
Experts	4	3.70	.40				

The data reveal that the computed t-value of 1.10 is less than the tabular t-value of 2.13 at 0.05 level of significance and 4 degrees of freedom. Therefore, the null hypothesis is accepted. Furthermore, there is no significant difference between the evaluations of the two group of respondents in terms of format of the process skills-based instructional materials.

This implies that the Science teachers and experts have the same perceptions about the format of the developed process skills-based instructional materials.

Table 9. Test of Significant Difference in the Evaluation of the Two Groups of Respondents of the Developed Process Skills - Based Instructional Materials in terms of Accuracy and Up-To-Datedness of Information

Respondents	Items	Weighted Mean	Standard Deviation	Computed t-value	Tabular t-value at 0.05, 4 df	D	I
Science Teachers	4	3.62	.41	0.20	2.13	Accept Ho	NS
Experts	4	3.65	.39				

The table revealed that the computed t-value of 0.20 is less than a tabular t-value of 2.13 at 0.05 level of significance and 4 degrees of freedom. Therefore, the null hypothesis is accepted. Furthermore, there is no significant difference between the evaluations of two group of respondents in terms of accuracy and up-to-datedness of information of the process skills-based instructional materials.

This implies that the science teachers and experts have the same perception about the accuracy and up-to-datedness of information of the process skills-based instructional materials in science 7(Physics).

**Performance of the Student Respondents Before and After using the Process Skills – Based Instructional Materials**

Table 10. Comparison of the performance of the students Before and After Utilization of Process Skills-Based Instructional Materials

Test	Weighted Mean	Mean Difference
Pretest	17.78	21.54
Posttest	39.32	

It can be gleaned from the table that there is a mean difference of 21.54 in the pretest and posttest scores of grade 7 students. It indicates that there is an increase in the performance of the students after the utilization of process skills-based instructional materials (PSBIM).

This implies that the use of process skills-based instructional material (PSBIM) has improved and developed the process skills of grade 7 students.



Table 11. *Test of Significant Difference in the Pretest and Posttest Results of the Student Respondents*

Test	Number	Weighted Mean	Standard Deviation	Computed t-value	Tabular t-value	D	I
Pretest	4	17.78	5.28	28.85	2.105	Reject Ho	S
Posttest	4	39.32	6.44				

The table revealed that the computed t-value of 28.85 is greater than a tabular t-value of 2.105 at 0.05 level of significance. Therefore, the null hypothesis was rejected. Furthermore, there was a significance difference in the result of the pretest and posttest scores of the student respondents.

This implies that the developed process skills-based instructional materials (PSBIM) in science 7(Physics) was effective and improve the process skills and performance of the students.

**Level of Grade 7 Students Process Skills Before and After Utilization of the Process Skill - Based Instructional Materials**

Table 12. *Level of Grade 7 Students Process Skills Before and After Utilization of the Process Skill-Based Instructional Materials in terms of Observing*

Observing In learning Physics, I can . .	Before		After	
	WM	VI	WM	VI
1. gather information through the use of senses	3.54	HL	4.58	VHL
2. see details that are important to the experiment.	3.12	MHL	4.12	HL
3. record data gathered during science activity.	3.4	HL	4.16	VHL
4. identify general characteristics of a group of items.	3.24	MHL	4.02	HL
5. make comparison on gathered data	3.32	MHL	3.96	HL
Average Weighted Mean	3.32	MHL	4.17	HL

The data reveal that before utilizing the process skill-based instructional materials, the students observing skills were moderately high as evidenced by the average weighted mean of 3.32. After utilizing the process skills-based instructional materials, the students observing skills were at a high level as evidenced by the average weighted mean of 4.17.

This implies that the students can students gather information and details that are important to the

experiment, record data gathered during science activity, and identify general characteristics of a group of items.

Table 13. *Level of Grade 7 Students Process Skills Before and After Utilization of the Process Skill-Based Instructional Materials in terms of Classifying*

Classifying In learning Physics, I can . .	Before		After	
	WM	VI	WM	VI
1. group things based on the common feature.	2.2	LL	2.68	MHL
2. sort things based on their similarities and differences.	2.2	LL	2.64	MHL
3. identify which not belong to the group	2.84	MHL	3.66	HL
4. arrange in sequence of natural events in order	2.58	LL	3.52	HL
5. sort things according to its characteristics	2.74	MHL	3.5	HL
Average Weighted Mean	2.51	MHL	3.2	MHL

It can be gleaned from the table that before utilizing the PSBIM the students classifying skills were at a moderately high level as evidenced by the average weighted mean of 2.51 .After using the process skills-based instructional materials, the students classifying skills are at a high level as evidenced by the average weighted mean of 3.2 .

However, even if all indicators got an interpretation of high level there was one indicator that had the lowest weighted mean of 3.5 which was to arrange in sequence of natural events in order.

This means that the students are able to group things based on the common feature, sort things based on their similarities and differences, identified which not belong to the group and sorted things according to its characteristics.

This implies that after utilizing process skills-based instructional materials, the students' science process skills in terms of classifying were improved.

It can be gleaned from the table 14 that before using the PSBIM, the students process skills on measuring were at a moderately high level with an average weighted mean of 2.91 Meanwhile, after using the process skills-based instructional materials the students' process skills on measuring is at a high level as evidenced by the average weighted mean of 3.53 as perceived by the grade 7 students.

However, further scrutiny of the data reveal that three of the indicators are interpreted as high level which are “the use of numbers to record measurements and



phenomenon”, “record data gathered” and “make a simple computation”. Two indicators were interpreted as moderately high level which are the “calculate and compare the number of items in the different groups” which has the lowest average weighted mean and “handle and use measuring devices for appropriate quantities”.

Table 14. *Level of Grade 7 Students Process Skills Before and After Utilization of the Process Skill-Based Instructional Materials in terms of Measuring*

Measuring In learning Physics, I can . .	Before		After	
	WM	VI	WM	VI
1. use numbers to record measurements and phenomenon.	3.1	MHL	3.90	HL
2. record data gathered	3.08	MHL	3.6	HL
3. make a simple computation	2.86	MHL	3.54	HL
4. calculate and compare the number of items in the different groups.	2.68	MHL	3.28	MHL
5. handle and use measuring devices for an appropriate quantity	2.82	MHL	3.34	MHL
Average Weighted Mean	2.91	MHL	3.53	HL

This means that students' process skills in terms of measuring improved after using the process skills-based instructional materials.

Table 15. *Level of Grade 7 Students Process Skills Before and After Utilization of the Process Skill-Based Instructional Materials in terms of Predicting*

Predicting In learning Physics, I can . .	Before		After	
	WM	VI	WM	VI
1. use previous data to predict what might happening	2.44	MHL	3.26	MHL
2. use pattern as evidence to make a prediction or expectation.	2.48	MHL	3.18	MHL
3. formulate a hypothesis based on the given data	2.7	MHL	3.24	MHL
4. formulate a hypothesis based on the given problem.	2.1	LL	3.32	MHL
5. extrapolate or interpolate to make a prediction	2.26	LL	3.22	MHL
Average Weighted Mean	2.40	LL	3.24	MHL

It can be gleaned from the table that before using the PSBIM, the students predicting skills were at a low level as evidenced by the average weighted mean of 2.40. After using the PSBIM ,the students predicting skill are at moderately high level as evidenced by the average weighted mean of 3.24.

However, after utilizing the PSBIM, even if all the

indicators got an interpretation of moderately high level there is one indicator, to use pattern as evidence to make prediction or expectation, with the lowest weighted mean of 3.18. This means that the students can use previous data to predict what might happen, formulate a hypothesis based on a given data, formulate a hypothesis based on a given problem and extrapolate or interpolate to make a prediction.

This implies that the process skills of the students before and after using the process skills-based instructional materials were improved.

Table 16. *Level of Grade 7 Students Process Skills Before and After Utilization of the Process Skill-Based Instructional Materials in terms of Interpreting*

Interpreting In learning Physics, I can . .	Before		After	
	WM	VI	WM	VI
1. provide an explanation for a particular or substance.	2.24	LL	3.96	HL
2. organized data and draw a conclusion from it.	2.3	LL	3.72	HL
3. construct an argument from the data.	2.7	MHL	3.64	HL
4. revise interpretation of data based on a new information	2.08	LL	3.32	MHL
5. summarized information based on the gathered data	2.52	LL	3.42	HL
Average Weighted Mean	2.37	LL	3.61	HL

It can be gleaned from the table that before utilizing the PSBIM, the students interpreting skills were at a low level as evidenced by the average weighted mean of 2.37. After using the PSBIM, the students interpreting skills are at a high level as evidenced by the average weighted mean of 3.61.

Even though the majority of the indicators had interpretations of high level there is one indicator, to change data interpretation based on new information, with a lowest weighted mean of 3.32 with an interpretation of moderately high level.

Moreover, students provided explanation for a particular or substance, organized data and draw conclusion. Constructed argument from the data and summarized information based on the gathered data.

This implies that the process skills of students in terms of interpreting were enhanced after the utilization of process skills - based instructional materials.

It can be gleaned from the table that before using the



### Comments and suggestions by the Science Teachers and Experts

Teachers' Comments	Experts' Comments
a. The instructional material supported the curriculum, and the level of education and information of the instructional material are suited and appropriate to the grade level. b. The instructional material was very pleasing and appealing to the eye with very good and easy to comprehend samples. c. The developed instructional material was comprehensive and simple. d. Provide realistic picture than animated one. e. Provide proper spacing especially those lectures. <b>Suggestions</b> a. Provide more activities like problem solving. b. Integrate and emphasize context that is more relatable to the students. c. You could use the IDEA in the lesson exemplars or the 7 Es in the lesson plan to divide the parts of the IM. d. Make use of additional information like history, trending issues, new discoveries, quotes, ICT – based and mental games. e. It would be more attractive if more illustrations were provided so the students would be able to visualize and understand the learning content.	a. The material is very helpful for both teachers and students. b. PSBIM was a good source/reference for student's evaluation. c. The material was done in good taste, made use of the learner's senses and make the concepts easily grasped by the learner. d. Personally, I prefer to use this material, it is easy to understand and more attainable especially for the teachers /school without enough materials for a certain lesson. e. Just continue applying the different strategies.  <b>Suggestions</b> a. Provide enough space for problem solving activity. b. More interactive activity may add more interest to students. c. Answer key should be in reverse position with the other pages of the learning material. d. For computations, I suggest you follow some sort of format like GUFSA. e. Adapt and embrace every new trend in learning outcomes.

PSBIM, the students communicating skills were at low level as evidenced by the average weighted mean of 2.39. After using the PSBIM, the students' communicating skills are at a moderately high level as evidenced by the average weighted mean of 3.30.

Table 17. Level of Grade 7 Students Process Skills Before and After Utilization of the Process Skill-Based Instructional Materials in terms of Communicating

Communicating In learning Physics, I can . .	Before		After	
	WM	VI	WM	VI
1. explain the result of the experiment	2.56	LL	3.5	HL
2. organize and present a report systematically and clearly	2.06	LL	3.38	MHL
3. read and compile information in chart, diagram, graph and table.	2.18	LL	3.54	HL
4. make a pictorial or written language to describe an event, action or object.	2.72	MHL	3.04	MHL
5. put a various place of information together to make a statement.	2.42	LL	3.02	MHL
Average Weighted Mean	2.39	LL	3.30	MHL

Further examination reveals that before utilizing the process skills-based instructional materials most of the process skills of grade 7 students were interpreted as low level. After utilizing the process skills – based instructional materials the communicating skills of the students of the students in terms of three indicators improved to a moderately high level with the last two to a high level. After using the PSBIM two indicators were interpreted as high level, which are “explain the results of the experiment “and “to read and compile information in chart, diagram, graph, and table.” The last three indicators were interpreted as moderately high level: the indicator with the lowest average mean of 3.02 is “to put various places of information together to make a statement”.

This implies that the use of process skills-based instructional materials helped students enhance their communication process abilities.

### Conclusion

Based on the findings, the following conclusions were arrived at: (1) The developed process skills- based instructional materials enhanced the students basic process skills in terms of observing, classifying, measuring, predicting, interpreting and communicating. (2) The science teachers and experts had the same views on the evaluation of the PSBIM. (3) The Performance of the Grade 7 Students improved after the utilization of the PSBIM.

In the light of the findings and conclusions of the study, the following recommendations are offered: (1) The developed process skills-based instructional material should reproduce and tried out to other schools in the Division of Rizal. (2) Other researchers may conduct similar studies utilizing the advance science process skills. (3) In-service trainings, Workshops and Learning Action Cell sessions about the creation and usage of instructional materials maybe conducted.

### References

Bartolome, Michelle L. (2016) Enrichment Materials in Chemistry for Grade 9. Unpublished Master's Thesis. Marikina Polytechnic Colleges

DepEd Order No. 018 s.2020 stated the policy guidelines for the provision of learning resources in the implementation of the Basic Education Learning Continuity Plan (BE-LCP).

Escobar, Christine B. (2017) Development and Evaluation of Supplementary Learning Materials in Biology for Grade VII Students. Unpublished Master's Thesis. Marikina Polytechnic College

Kramer, M.A., & O Dalay and Walker J.D (2018). Design and Assessment of Online, Interactive Tutorials that teach Science



process Skills. Life Science Education,1-11.

McCombes, Shona (2019) Descriptive Research. Retrieved from scribbr.com/methodology/descriptive-research/. November 21,2019.S

Marces, Ian Ismael E. (2015) Development and Validation of Enrichment Learning Materials in Physics for Grade 7 Students. Unpublished Master's Thesis. Marikina Polytechnic College

Mendoza, John Ray E. (2019). Effectiveness Of Multiple Representation Strategy of Teaching in Enhancing the Science Process Skills and Performance of Grade 8 Students. Unpublished Master's Thesis. Marikina Polytechnic College, Marikina City.

M.K Abadi, M & Cahya, Erik & Jupri, A. (2017). The Development of Interactive Mathematics Learning Material Based on Local Wisdom. Journal of Physics: Conference Series. 895. 012086. 10.1088/1742-6596/895/1/012086.

Rauf,Rose AmnahAbd, Mohamad Sattar Rasul, Azlin Norhaini Mansor , Zarina Othman, and N Lyndon "Inculcation of Science Process Skills in a Science Classroom " , Asian Social Science , 2013.

Rohani, Husaini, ZanatonIkhsan, Hasnah Toran. "A Comprehensive 21st Century Child Development through Scientific Process in Early Science " , Creative Education, 2019.

Safaah, Sekar & Muslim, Muslim & Liliawati, Winny. (2017). Teaching Science Process Skills by Using the 5-Stage Learning Cycle in Junior High School. Journal of Physics: Conference Series. 895. 012106. 10.1088/1742-6596/895/1/012106.

Taylor, Wendy (2019) Enrichment in the Classroom. <https://learningessentialsedu.com/enrichment-in-the-classroom/>.

Zeidan, afif. H. and Jayosi, Majdi R. (2014). Science Process Skills and attitudes toward science among Palestinian Secondary School students. World Journal of Education.,13-24.

### **Affiliations and Corresponding Information**

**Elmerlyn A. Dionisio**

Montalban Heights National School

Department of Education - Philippines