Development and Evaluation of Module on Earth and Space

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Abstract – *This study entitled "Development and Evaluation of Module on Earth and Space" centered on the development of a module that provides activities and lessons for students to learn and eventually improve their academic performance in Science. Following the protocol of utilizing a learning material, the Module was evaluated using a set questionnaire. Based on the collected, computed, and tabulated data, the Module was described by the teacher respondents to have specific, measurable, attainable, realistic, and time-bound and relevant learning objectives. The module has simple, appropriate and enjoyable illustrations which are logically and properly sequenced. It also provides procedures and contains available materials prescribed in the activities. Furthermore, the Module provides the learners to think logically and critically, all of which are relevant requirements for students to learn and eventually improve their academic performance. The teacher respondents strongly agreed that the evaluation portion of the module provides effective measurement in determining the students understanding as it reflects behavioral activities which are highly appropriate to the learners' mental development and provides rubrics to evaluate the students objectively; thus, preparing the learners to become independent and confident in learning Science.*

Keywords – Earth and Space, Module, Science 8, Supplementary Learning Material,

INTRODUCTION

Teachers, in a changing world have two major tasks: the extension of the quantity of education available, and the improvement of the quality of education. Concern with the quality of education is inextricably related to the school's ability to adapt to the needs of a rapidly changing world; for schools and teachers both tend to continue to behave in the way they have grown up; the problem, then, is to help them grow up 'flexible', 'adaptable', able to meet changed circumstances in an appropriate manner: This is a problem that concerns with the changing education systems, as well as the teaching they provide for their students.

The K-12 curriculum has been implemented in the Junior High School since 2012. New curriculum means new and updated learning materials. Activities in all the lessons should be aligned to what the curriculum guides demand. Being left behind to these demands can be a great impact to the students' academic performance.

According to Torrefranca (2017) modular instruction is an attempt to individualize learning by allowing a student to achieve mastery of one unit of content before moving on to another [9]. Module, as a self-instructional material, can be used as a supplementary material to help the student improve his/her mastery and as means to help the student catch up with the missed lessons.

Isola (2010) defined instructional materials as objects or devices that assist teachers to present their lessons logically and sequentially to the learners [7]. This means that they serve as a guide to the teaching and learning processes through the logical and sequential preparation and presentation of lessons.

As defined by Abdu-Raheem (2016) instructional materials are essential and significant tools needed for teaching and learning of school subjects to promote teachers' efficiency and improve students' performance. They make learning more interesting, practical, realistic and appealing. They also enable both the teachers and students to participate actively and effectively in lesson sessions. They give room for acquisition of skills and knowledge and development of self- confidence and self- actualization [1].

According Camara (2016) a good module should meet the following requirements: it should be self-contained, self-pacing, and motivating; its topic or subject matter should be well-defined and short enough; it should provide opportunities for interaction with the learners; its objectives and activities should be properly sequenced; it should be accurate; it should be written in clear, correct language suitable to the level of the target learners; it should be utilized every opportunity to achieve effective outcomes of learning; it should have all the necessary parts of a module; it should suggest or contain possible supplementary materials including recorded lectures, cases, files, etc.; it should encourage innovativeness and experimentation; and it should be written to make it interesting and appealing to the learner [3].

As cited by Sebastian (2017), the module should be consisted of the following: statement of the specific instructional objectives that the students are supposed to master at the end of unit; a description of the contents to be studied by the students throughout the lesson; a list of learning tools to be provided and used by students in the teaching-learning process; a material for learning activities to be conducted by the students in the form of text containing reading passage and direction and worksheets containing assignments and student's activity sheets; an answer key for worksheets and assignments; a test booklet to measure the student's level of mastery from the materials studied; a scoring key for the test containing the information about the correct answers; and a teacher's manual containing the directions for using the manual [8].

In view of this fact, and as part of the educational system in a changing world and in a society, that needs to change, and driven by the desire to find remedy to the demands and problems, the researcher developed a Module focusing on reinforcing the students' improvement to their academic performance in Science. The use of the Module in teaching-learning process may help the students recall and eventually apply skills as they perform not just Science activities but also their activities or lessons in other subjects and more importantly in their everyday lives. It has the potential to improve the learners' academic performance in Science. Apart from these, the Module is designed in such a way that the students can learn even on their own with a minimal or no assistance from the teacher. The topics in the Module were localized and contextualized by the researcher for the students to relate on the topics, and the materials on

the activities/experiments were improvised to make the materials easily available.

OBJECTIVES OF THE STUDY

Generally, this study aimed to develop a module on earth and space, evaluated by science teachers.

Specifically, the study sought answers to the following questions:

How do teacher-respondents evaluate the Module on Earth and Space be described in terms of:

3.1. statement of the desired learning objectives;
3.2. content and organization of ideas;
3.3. provision for evaluation;
3.4. clarity of ideas presented; and
3.5. learners and the module?

MATERIALS AND METHODS

Methods

In this study, the descriptive method was applied in the development and evaluation of Module on Earth and Space. The researcher developed a Module on Earth and Space using Science textbooks and downloaded activities from several internet sites. Most of the activities were modified making each activity appropriate for the learners' age in the same manner that intended knowledge and skills for each Science topics were taught and mastered among students.

To further validate the usefulness of the module in terms of realizing its ultimate learning objectives, the learning material was evaluated by secondary Science teachers and supervisor in the Division of Cabanatuan City using a set of questionnaire/checklist.

Materials

The following are the materials that were used to conduct this study:

Module on Earth and Space. It was developed by the researcher based on prior reviews on several Science textbooks and the needed learning competencies to acquire knowledge and skills.

Evaluation Checklist/Questionnaire. The developed Module on Earth and Space was evaluated by selected secondary Science teachers and supervisor using an evaluation checklist/questionnaire.

RESULTS AND DISCUSSION

This section overseen the presentation, analysis and interpretation of data gathered by the researcher from the Teacher-Respondents' Evaluation of the Module.

Table 1: Statement of the Learning Objectives

STATEMENT OF THE LEARNING OBJECTIVES	Weighted Mean	Verbal Description
1. The objectives are specific, measurable, attainable, reliable and time-bound.	4.72	Strongly Agree
2. The stated objectives are relevant to the student's need.	4.63	Strongly Agree
Average Weighted Mean	**4.68**	**Strongly Agree**

Table 1 shows that respondents agreed that the module contains learning objectives that help increase students' academic performance in Science. The learning objectives are also useful in measuring the students' improvement in the skills intended for learning.

The statement of learning objectives is one of the most important elements in designing a supplementary learning material. As what Abdu-Raheem (2016) has proven in his study, activity teaching was more appreciated by both the students and teachers when the final outcome for learning was achieved [1]. It wined satisfaction and fulfillment among teachers and students. Thus, statement of learning objectives in module

is a great factor in helping students achieves these objectives

Table 2. Content and Organization of Ideas

CONTENT AND ORGANIZATION OF IDEAS	Weighted Mean	Verbal Description
1. The activities/experiments provided in the learning material are manageable.	4.63	Strongly Agree
2. The learning material helps learners to think logically and critically.	4.66	Strongly Agree
3. The illustrations used are simple, correct and make the procedure more understandable.	4.75	Strongly Agree
4. The writing style of the learning material makes it enjoyable to read.	4.62	Strongly Agree
5. The organization of the lesson is logical and properly sequenced.	4.65	Strongly Agree
6. The lessons are localized and contextualized.	4.73	Strongly Agree
7. The activities/experiments are relevant in understanding and applying the Science concepts.	4.75	Strongly Agree
8. The activities/experiments are sufficient to understand and apply the Science concepts.	4.50	Strongly Agree
9. The materials used in the activities/experiments are available and relevant to the students' need.	4.59	Strongly Agree
Average Weighted Mean	**4.63**	**Strongly Agree**

The results satisfied Isola's (2010) claim that it is important that the content and organization of the learning material should be engineered in many logical ways according to the nature of the material and characteristics of the students, whom the learning material is designed for, as such as from simple to complicated, from the known to unknown, from facts and partial information.

Table 3. Provision for Evaluation

PROVISION FOR EVALUATION	Weighted Mean	Verbal Description
1. The guide questions at the end of each activity reinforces the understanding of Science concepts.	4.53	Strongly Agree
2. The operations at the tests reflect the behavioral objectives in the learning material	4.65	Strongly Agree
Average Weighted Mean	**4.59**	**Strongly Agree**

The data revealed that the guide questions can be very useful in measuring the students' learning. According to Hudson's (2012) observation, activity teaching was more appreciated by both students and teachers when the final outcome of teaching-learning was achieved. Since objectives were clearly stated at the beginning of each activity and lesson, then the students were expected to learn and achieve more focusing on these learning objectives. As a result, the evaluation part became a challenge on their part. Cancer cited by Sebastian (2017) also mentioned about the preparation and evaluation of a learning module in statistics. A significant difference exists between the achievement in Statistics of students who used the learning modules in Statistics and the students who taught statistics the traditional way. The difference was in favor of the experimental.

Table 4. Clarity of Ideas

CLARITY OF IDEAS	Weighted Mean	Verbal Description
1. The language of the module is clear.	4.73	Strongly Agree

2. The discussion of the lesson is simple and clear.	4.69	Strongly Agree
Average Weighted Mean	**4.71**	**Strongly Agree**

The result supported the suggestions of Sebastian (2017), that contents of a module should be written in clear, accurate language suitable to the level of the target learner. The language and terms used in the Module was simple taking into consideration the target respondents who were Grade 8 students.

Table 5. Learners and the Module.

LEARNERS AND THE MODULE	Weighted Mean	Verbal Description
1. The lesson is relevant and suited to the learners' level of mental development.	4.72	Strongly Agree
2. The module is functional and relevant for mastering Science concepts.	4.66	Strongly Agree
3. Through the module, students are able to observe independence and self confidence in understanding and applying Science concepts.	4.72	Strongly Agree
Average Weighted Mean	**4.70**	**Strongly Agree**

The Teacher-respondents strongly agreed that the Module can help learners in understanding the Science topics and eventually increase the students' academic performance since each activity is designed according to respondents' age and their level of learning ability. Respondents tend to enjoy while conducting the activities included in the learning material. This further proved Torrefranca (2017) claim that activity-based learning is an effective tool in an educational environment. The activities presented in the Module provided opportunity for Learners to achieve effective learning outcomes. The activities were also interesting and enjoyable among the learners making them interested and engaged in each activity.

CONCLUSIONS AND RECOMMENDATIONS

Based on these findings, the researcher concludes the following in this study.The results have been observed in the study that the Module on Earth and Space was described by the teacher-respondents to:

1. included objectives which are described to be SMART- Specific, Measurable, Attainable, Reliable and Time-bound;
2. contain activities which are manageable, logically and properly sequenced and useful in helping students understand and apply Science concepts.
3. include evaluation which can reinforce students' knowledge in Science concepts and reflects behavioral objectives in each activity;
4. use language which is clear and the discussion for each lesson is simple; and
5. provide activities and lessons which are relevant to the learners' level of mental development, functional and relevant for mastering Science concepts.

Based on these conclusions, the following recommendations are provided in this study:

1. It is recommended to utilize the Module on Earth and Space to the school level.
2. Continue developing contextualized and localized modules for other science domains in different grade levels.

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