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Research Article

Biohub7.Com: A Self-Paced Information Education and Communication Material in Grade 7 Students

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Abstract:

This study was conducted to develop and validate the biohub7.com a self-pace information, communication material for Grade 7 Biology. Specifically, it sought answers to the following questions: 1. What is the result of the GRACE PASS in Science 7 in terms of Living Things & their Environment? 2. What are the least mastered competencies of Grade 7 students in living Things & their Environment on the GRACE-PASS? 3. What information, education and communication material can be developed based on the results? 4. What is the result of the curriculum validation of the developed material? The first set of respondents is the ninety-seven grade 7 students of the University of Saint Anthony A/Y 2023-2024. The second set of respondents were the fifteen (15) science teachers that served as the validators. In the determination of the curricular validity of the developed self-paced Multimedia Instructional Materials, the researchers used E.B. Rivera evaluation form, frequency count, rank ordering, weighted mean, and Likert scale.

Keywords: Development, Validation, Multimedia Instructional Materials, Biology 7

1. Introduction

Science education is seen as an applied tool in learning since of its relevance to students' lives. It aims to provide bigger opportunities for students to realize that principles studied in science can be applied to real-life situations. The quality of science education is critical for advancing students' scientific and societal development. Over the past decades, students' interest and achievement in biology have declined (Osborne & Collins, 2018). According to Aikenhead (2019), biology and microbiology are irrelevant and uninteresting, mainly because their instruction is out of synchrony with the world outside the school.

The Program for International Student Assessment in 2023 states that the Philippines ranked 77th out of 81 countries globally in the student assessment who got the averaged 373 points in scientific literacy released on December 5, compared to the OECD average of 489 points. The average student in the Philippines has a proficiency level of 1a. At level 1a, a typical 15-year-old student can recognize and explain simple scientific phenomena by applying fundamental principles or everyday content and procedural knowledge. They can assist others in conducting structured scientific investigations involving no more than two variables. They require little cognitive effort to establish direct causal or correlational relationships and interpret graphic and visual data. In comparison, an average 15-year-old OECD student at Proficiency Level 3 can construct explanations for familiar phenomena based on moderately complex content knowledge. In the 2023 PISA scientific literacy assessment, the Philippines scored significantly lower than all ASEAN countries. It also reflects the urgency of continuous improvement of the learning environment and varied methods of teaching and learning science.

Consequently, this research is conducted to provide eloquent learning experiences for students. From the given data that the researcher gathered from their monthly scientific examination, it is found that biology got the lowest average mean; therefore, the researchers' basis in conducting this research is their self-made test. According to Prahba (2016), the first-hand experiences gained through self-paced information, education and communication material as instructional strategy streams a permanent impression on the mind of the students. This kind of experiences provided by this educational tool enable the students in mastering the subject biology and as well as realizing great potential to attract students into specific subjects in biology.

Multimedia learning also provides multi-sensory experience, combining text, graphics, images, audio, and video. This method promotes independent learning and enhances understanding, reflection, and critical thinking. For science education, this self-paced educational material enables direct learning with the physical world, enhance needed skills, and integrate technology to improve students' academic performance, boosting their interest and curiosity about the subject matter, resulting in increased engagement.

According to Antonio (2018), multimedia helps students develop critical thinking, encourage independence, and improve scientific attitudes and science processing skills.[5] they emphasize that there is a positive relationship between students' science processing skills which are highly integrated in technologies. Therefore, multimedia learning strategy is essential in science education and its different branches, such as providing opportunities for students to acquire science processing skills and promoting the development of 21st-century skills by implementing student-centered and student-directed learning. Multimedia learning strategies enhance teaching skills and create an exciting classroom environment. This approach improves conceptual understanding and academic performance, benefiting student well-being.

2. Research Design

The researchers used the descriptive-evaluative method to collect information on the current conditions. It seeks to characterize the nature of a situation as it appears at the moment of study in addition to investigating specific phenomena. According to Kothari and Garg (2014), the descriptive technique describes current features, makes precise forecasts, and recounts facts about a certain individual, group, or situation. Borg and Gail (2013) the descriptive research method's outcomes have been characterized into four categories: description, prediction, improvement, and explanation. They claim that descriptive research describes a natural or man-made educational phenomenon that interests policy makers and educators. On the other hand, evaluative research is used to evaluate a product or concept and collect data to help improve the solution. The fundamental goal of evaluation study is to determine whether or not a procedure or strategy produced the expected results. In this study, a descriptive-evaluative method was used to develop and validate a self-paced Information, Education and Communication Material in Science 7 to gather information and understand if the intervention material made is valid and effective in addressing the least mastered competencies identified in Science 7.

2.1 Respondents of the Study

The first set of respondents is the ninety-seven Grade 7 students of the University of Saint Anthony A/Y 2023-2024. The researcher used total population sampling in choosing the first respondents of the study through GRACE PASS previous selection. According to ASEC, it is used to obtain a representative sample. This technique stratifies the population into several non-overlapping subpopulations or strata, and sample items are selected from each stratum. It is utilized in the study as it allows researchers to draw more precise conclusions by ensuring that every subgroup is appropriately represented in the sample. Total population sampling is a type of purposive sampling where the population is of interest. It is most practical when the total population is manageable, such as a well-defined sub-group of a larger population. For example, the total population sampling would be an excellent way to survey to get the opinion. In practice, total population sampling occurs when the target group is small and set apart by unusual and well-defined characteristics. The second set of respondents were the fifteen (15) science teachers that will serve as the validator since they have provided instruction for more than three years and beyond, as well as give guidance to help students explore and understand essential concepts in science, including problem-solving and how to gather evidence to support ideas or decisions. Also, they created a positive and inclusive learning environment for all students, which inspired the learners to love science and encouraged them to think critically and ask questions. They are well-versed in the assessment of developed instructional materials as well as their utilization.

2.2 Research Instrument

Self-Made Test is a test that the researchers utilized to determine the least mastered competencies in Biology 7. It is a powerful mechanism to measure the student's knowledge. It encourages students to reflect on how their work meets the goals for learning concepts and skills. It promotes metacognition about what is being learned and practical practices for learning. The self-made test consists of 60 questions, 6 questions each for every learning competency in Biology. According to Froy (2018) self-made test is a type of assessment with a set of written questions (multiple choice that assesses the learner's current knowledge base or current view on a topic/issue to be studied in the course. The goal is to get a snapshot of where the students currently stand- intellectually, emotionally, or ideologically – allowing the instructor to make sound instructional choices regarding how to teach the various course content and what teaching approach to use. This method allows instructors and students to chart their learning process.

An adapted assessment and evaluation guidelines and processes for LRMDS from DepEd is used in this study to determine the curricular validation of the developed Self-paced Information Education and Communication Material in Science 7. Creswell (2012) averred that the questionnaire could fully explore some aspects of the phenomenon in the study. Informal interviews, library techniques, and research conducted through the Internet were also employed as additional data gathering tools.

2.3 Data Gathering and Analysis

The development of the Self-paced Information, Education and Communication Material in Science 7 base on the identified least mastered competencies following the ADDIE Model format. The researcher followed the following stages:

Preparation of the Learning Material involves techniques and construction and validation in creating supplemental instructional material. The researcher decided ADDIE model, which was popularized by Molenda (2013).[6] It is a simple and standard model for creating instructional material. It is an acronym for analyze, design, develop, implement, and evaluate. The researcher adopted this model because it is straightforward and appropriate for the time and research duration.

Analyze refers to the breakdown of data one has. This phase of the study identifies and analyzes the least mastered competencies in Grade 7 Science, mainly Biology. Design refers to the plan of action to develop the material. This phase involves planning the instructional material's development based on the identified least mastered competencies. It involves the design of the content, activities, and assessments the material will have. Develop. This phase is the actual creation of the material being developed. It involves the actual creation of the different parts of the resource, such as content, activities, assessments, and other materials that need to be used to make the instructional aid. Implement. This stage allowed the researchers to test the material to determine its functionality and appropriateness. The researchers conducted a dry run of the developed material to ensure that errors during its

development would be eliminated. Five teacher evaluators pre-assessed the developed material to determine its functionality and appropriateness. The researchers improved the errors identified during the dry run. Evaluate is the last phase of this study was to evaluate the validity of the multimedia instructional material. The final phase, the evaluation, ensures the material will affect the desired goals. The researchers conducted validation of the learning material with the help of 15 actual evaluators to measure the quality of the material before implementing it with the students. The validation process involved the Science teachers. The researcher used a validation tool from the research of Rivera as the instrument to identify the curricular validity of the material developed.

3. Results and Discussion

From the statistical treatment of the data with the corresponding analysis and interpretation to that, the following findings have surfaced:

3.1 In terms of Living Things & Their Environment, 44% of respondents to the GRACE PASS Test Science 7 verbally interpreted their score as nearing proficiency and had a yellow coloration. The Science 7's overall performance in relation to the environment and living things is classified as approaching proficiency.

3.2 It shows that competency number three and ten, "describe the different levels of biological organization from cell to biosphere and predict the effect changes in one population on other populations in the ecosystem," garnered the lowest average score of two that has a verbal interpretation of least mastered. In increasing mean average score, competencies two, six and seven falls under the least mastered competency, which has an average score of 3; the competency is "focus specimens using the compound microscope, describe the process of fertilization and communicate that the major organs work together to make the body function properly". It also shows that competency number four, five and eight have a mean average score of 4.00; the competency is "differentiate plant and animal cells according to presence or absence or certain organelles and explain why cell is considered the basic structural and functional unit of life and differentiate biotic and abiotic components, while competency number one and nine has a mean average score of 5. The table above implies that the average mean scores of the students in each competency fall under the least competency. Therefore, the researchers made a questionnaire with the least mastery of all competencies of Science 7 in Biology.

3.3 In this study, the curricular validation of multimedia instructional material in Chemistry in terms of its content, an average weighted mean of 4.18, an equivalent description of very satisfactory. The specific indicator verbally rated as outstanding is on having lessons aligned with the curriculum, 4.22, and having information about the different topics is accurate and precise. This only implies that the topic in the text complies with the minimum requirement in the Most Essential Learning Competency. It is shown that all indicators measuring the characteristics of the topics' presentation of the material are met very satisfactorily, with an average mean value of 4.15. In particular, these indicators are the topic presented in a logical and orderly sequence; 4.18, the structure, style, and format are appropriate to the target level; 4.17, the illustration arouses students' interest making learning effective and enjoyable. 4.16. The topics fit the course sequence, 4.15; The direction is concise, readable, and easy to follow, 4.13, and; There is a sufficient familiar vocabulary to ensure learning, 4.11. With these results, the presentation of the lessons is an adequate and logical matter that can arouse the students' interest. However, given more attention, this can still be improved. As to respondents' evaluation of the learning activities of the learning material, the overall mean of 4.21 or outstanding shows that various supplementary activities are well provided. The indicators with a verbal rating of outstanding are: arouse students' interest to solve the exercises, 4.23; the learning activities provide opportunities for instruction with a learner, 4.22. It gives insights and ideas about what the activity is all about, 4.21; Stimulate the learners to intellectual activities, 4.21; while considered as very satisfactory are: Well-designed and challenging to students, 4.19 and; exercises are in line with the level of comprehension 4.18. The last portion in the curricular validation of the learning material is the assessment/ evaluation, which gained an average of 4.16, described as very satisfactory. All the indicators herein included also obtained the same qualitative rating, and they are: The learning resource material has provisions for self-assessment 4.19; The learning resource material has provisions for self-assessment, 4.18; The items in the evaluation are congruent to the specific objectives, 4.17; There are items which measure higher thinking skills, 4.15, ND; the item covers the essential competencies to be developed, 4.13.

3.4 Based on the tabulated result, there are 21, or 36.84 percent, obtained test scores ranging from 85-89 with a qualitative description of very satisfactory, 20, or 35.09 percent are within 80-84 with satisfactory, 12, or 21.05 percent are within 90-100 or outstanding; 4 or 7.02 percent are within, and none 75-79 got a score 74 and below.

4. Conclusion

In view of the research findings, the following conclusions were drawn:
In terms of Living Things & Their Environment, 44% of respondents to the GRACE PASS Test Science 7 verbally interpreted their score as nearing proficiency and had a yellow coloration. The Science 7's overall performance in relation to the environment and living things is classified as approaching proficiency. The data implies that the mean scores of the students in each competency fall under the least competency. Therefore, the table shows that based on the researcher-made questionnaire, the students have least mastery of all Science 7 along Living things and their environment competencies.

The self-paced Information, Education and Communication Material was developed based on the learner's needs, whereas its content helps to vary and enhance the learning process, leading to better knowledge retention. Furthermore, it provides more opportunities for students to engage with the content. Students worldwide can learn from course content made available through the learning material the researcher created.

The developed instructional material, "Biohub7.com: A self-pace Information, Education and Communication Material for Grade 7 students," is valid as assessed by science experts. The validators also recommend the possible use of the learning material, provided that the suggestions and recommendations are integrated.

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