Development and Validation of Learning Material in Statistics and Probability

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Abstract

This study sought to develop a learning material in Statistics and Probability. It was conducted and involved by Education Program Supervisor in Mathematics, Chief of Curriculum Implementation Division, and Senior High School teachers teaching Mathematics of five mega schools and five non-mega schools of Schools Division Office I Pangasinan. The main instrument of the study was based from the existing learning material used in teaching Statistics and Probability. The data were collated and analyzed using frequency and percentage for profiling, average weighted mean on the computing the levels of data, chi-square for significant relationship where nominal data is involved, and comparing means for significant difference of the data. Based from the findings and results of the study, the researcher concluded that there are existing learning materials used by teachers in teaching Statistics and Probability but are not adequate and relevant. Also, the perception of mega and non-mega schools on the adequacy of the existing learning materials in Statistics and Probability has no difference. Therefore, there is a need to develop learning material to be used in teaching Statistics and Probability learners. The proposed learning material in Statistics and Probability was validated as very acceptable by the Schools Division officials, Mathematics teachers of mega and non-mega schools in SDOI Pangasinan across all criteria.

Keywords: Development, Validation, Learning Material, Statistics, Probability

INTRODUCTION

Teachers, as the primary molders of young people play one of the biggest roles in the development of the country's future, a role, next in importance to that of parents [1][2]. This is a responsibility, for in the hands of teachers lie the future of the students. From the guiding hands of teachers emerge the great achievers in all fields of human endeavor. The teacher is the most important figure in the classroom who is someone can effect change or learning because he or she is an expert in what he or she teaches, and in how he or she teaches.

In its desire to provide equity in access and quality education to all citizens, the Department of Education has implemented various ways to attain its vision, mission, goals, and objectives. The enactment for example of RA 9155 otherwise known as the Governance of Basic Education Act of 2001 mandated every sector of the educational system to implement reforms and ensure the schools' continuous improvement of learning outcomes all over the country. Added to this is the implementation of the K to 12 reform program whose objective is to produce graduates in the basic education who are equipped with the 21st century skills needed for productivity and global competitiveness [3]-[5].

Part of the program is making the curriculum relevant to learners through contextualization and enhancement. Activities, songs, poems, stories, and illustrations are based on local culture, history, and reality to make the lessons relevant to the learners and easy to understand. Students acquire in-depth knowledge, skills, values, and attitudes through continuity and consistency across all levels and subjects [6]-[10].

According to Right (2018), instructional material is a generic term used to describe the resources teachers use to deliver instruction [11]. Teaching materials can support student learning and increase student's success [12]. Ideally, the teaching materials will be tailored to the content in which they are being used, to the students in whose class they are being used, and the teacher who will utilize them. They come in many shapes and sizes, but they all have in common the ability to support student learning [13]. These materials are important because they can significantly increase student achievement by supporting student learning. Regardless of what kind, all have some functions in student learning. Interestingly, these materials add important structure to lesson planning and delivery of instruction, particularly in lower grades. Learning materials act as a guide for both the teacher and the student. They can provide a valuable routine. In addition to supporting learning more generally, learning materials

can assist teachers in an important professional duty: the differentiation of instruction [14]-[17]. Differentiation of instruction is the tailoring of lessons and instruction to the different learning styles and capacities within the classroom. Learning materials such as worksheets, group activity instructions, games, or homework/assignments all allow to modify assignments to best activate each individual student's learning style [18]-[20].

It is important for educators to adopt instructional design techniques to attain higher achievement rates in especially in mathematics [21]. Considering students' needs and comprehension of higher-order mathematical knowledge, instructional design provides a systematic process and a framework for analytically planning, developing, and adapting mathematics instruction. Based from the study, results revealed that instructional strategies and methods, teacher competency in math education, and motivation or concentration were the three most influential factors that should be considered in the design decisions [22].

Moreover, according to Camara (2016), a good learning material should be self-contained, self-pacing, and motivating. Also, its subject matter should be well-defined and short enough and should provide opportunities for learners to interact. The objectives and activities of a learning material should be properly sequenced, accurate, written in clear and correct language suitable to the level of the learners, and utilized every opportunity to achieve the learning outcomes of learning [23].

Factors contributing to poor performance include under staffing, inadequate teaching/ learning materials, lack of motivation and poor attitudes by both teachers and students, retrogressive practices. Improving on these factors and sensitization of the local community to discard practices which prohibit student's effective participation in learning mathematics could improve performance in Mathematics [24][25].

The need today is for effective study of the actual teaching and learning situations. The students must be given more time and appropriate learning tools to master thoroughly concepts of subject matter especially in Mathematics. With the innovation seen every day, the mission of the teacher still remains the same: to educate the youth and provide them the abilities and skills to become capable, literate and productive citizen. With the new and ever-changing technology, it is still generally believed that no machine can ever take the place of a human brain, thus a teacher is always in the position to provide and to meet the needs of his or her students.

OBJECTIVES OF THE STUDY

This study sought to develop and validate a learning material in Statistics and Probability.

Specifically, it sought to answer the following sub-problems:

1. How adequate and relevant are the existing instructional materials in Statistics and Probability in the mega and non-mega Senior High Schools in Schools Division Office I Pangasinan?
2. Is there significant difference between the perception of the mega and non-mega schools?
3. What innovative learning material in Statistics and Probability can be developed to address the need of Senior High School learners?
4. How acceptable is the proposed innovative learning material based on the following criteria?
    a. Objectives
    b. Contents
    c. Clarity

MATERIALS AND METHODS

Respondents of the Study

The respondents of this study include 24 and 16 Senior High School teachers teaching Mathematics in mega Schools and non-mega schools respectively in Schools Division Office I Pangasinan. This study also includes the evaluation of officials of the division such as the Chief of the Curriculum Implementation Division and Education Program Supervisor of Mathematics. Table 1 and 2 show the distribution of respondents of this study according to the classification of schools.

Instrumentation

The validated questionnaires were the main data gathering of this study.

The researcher used two sets of questionnaires. The first one is used to validate the adequacy and relevance of existing learning material used in teaching Statistics and Probability. The second set is used for the validation of the acceptability as perceived by the respondents of proposed learning material formulated by the researcher.

Data-gathering Procedure

To gather the data needed, the researcher sought the approval of the Schools Division Superintendent of Schools Division Office I Pangasinan to administer the questionnaires and then asked permission to respective school heads of target schools.

The researcher personally administered and retrieved said questionnaires to the target respondents.

Statistical Treatment

The data were all encoded and analyzed in SPSS 20. Frequencies, percentages, and independent sample t-test were utilized in the study. Please take note that tables are deleted from this full issue – tables are found in the original article.

RESULTS AND DISCUSSION

This section discusses the presentation of the data gathered, their analysis and interpretation to answer the sub-problems raised in this study.

Table 3 and 4 show answers sub-problem number 1, asking how adequate and relevant are the existing learning materials in Statistics and Probability in the mega and non-mega Senior High Schools in Schools Division Office I Pangasinan.

Table 3: Adequacy of Existing Learning Materials in Statistics and Probability of Mega Schools

Table 4: Adequacy of Existing Learning Materials in Statistics and Probability of Non-Mega Schools

Based on findings, 2 out of 24 mathematics teachers in mega schools are using text book as learner's material in teaching Statistics and Probability but finds its fairly available; 1 out of 24 mathematics teachers in mega schools is using other materials in Statistics and Probability and finds it fairly available; and 2 out of 16 mathematics teachers in non-mega schools are using text book in teaching the subject and finds it is fairly available.

Table 5 displays the answers to the sub-problem 2 which is on the significant difference between mega and non-mega schools in terms of adequacy of the existing learning material in teaching Statistics and probability.

The result using t-test revealed that there is no significant difference on the perception of mega and non-mega schools in terms of the adequacy and relevance of learning material used in teaching Statistics and Probability.

Table 5: Difference of Perception of Mega and Non-Mega Schools on the Adequacy of Existing Learning Material in Statistics and Probability

The table 6 shows the result of relevance of existing learning materials in Statistics and Probability.

The result with a mean of 1.84 shows that the respondents do not agree that the existing learning materials which are textbooks and downloaded materials from internet are relevant in teaching Statistics and Probability

Table 6: Relevance of Existing Learning Materials in Statistics and Probability

The result in problem 1 where there is a very small number of schools that have a readily available learner's material and are not relevant in teaching the subject suggests that there is a need to develop learning material for the said subject. Furthermore, the result showed that none of the school makes use of Strategic Intervention Material and Course Book as a learner's material thus there is a need to develop such material for the use of the students.

Table 7 to 10 on the next page answer the sub-problem number 4 which is how acceptable is the proposed learning materials in Statistics and Probability base on the following criteria: a. objectives; b. contents; and c. clarity.

The result shows that the proposed learning material is very acceptable when it comes to its objectives, contents, and clarity across mega, non-mega schools and officials of Schools Division Office I Pangasinan. The results satisfied Camara (2016) and Funa & Ricafort (2019) claim that a learning material should include objectives which are described to be specific, measurable, attainable, reliable, and time-bound. A learning material should contain activities which are manageable, logically, and properly sequenced, and useful in helping learners to understand and apply concepts in the subject area and evaluation which can reinforce learners' mastery of concepts and reflects behavioral objectives in each activity. Moreover, the use of language which is clear and the discussion for each lesson is simple enough [23][26].

Table 7: Acceptability of Proposed Learning Material in Statistics and Probability (Mega Schools)

Table 8: Acceptability of Proposed Learning Material in Statistics and Probability (Non-Mega Schools)

Table 9: Acceptability of Proposed Learning Material in Statistics and Probability (Division Officials

Table 10: Acceptability of Proposed Learning Material in Statistics and Probability (Overall)

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