

Development Of a Digital Mathematics Pocket Book In Basic Statistics Courses

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Abstract. This research aims to determine the level of validity, effectiveness and practicality of digital mathematics pocket books in basic statistics courses in the graphics engineering study program. This research is a type of R & D (Research and Development) research that uses a 4D development model consisting of the definition, design, development and disseminate. This research was carried out in June 2024 on students of the PSDKU Makassar Polimedia Graphics Engineering Study Program. The instruments used are expert validation sheets, observation sheets, questionnaires and student learning outcomes tests. The validity value of the pocket book shows a value of 4.8, the student response questionnaire and lecturer response scores are 84.9 and 88.9, the lecturer's ability value in managing learning is 4.62 and the learning outcomes test is 89.58 so it can be concluded that the pocket book meets the requirements. valid, practical and effective criteria.

Keywords: Development, Pocket Book, Statistics Courses.

1 Introduction

Given the significance of education in the nation and the role of learning within it, it is essential to establish criteria for formulating educational objectives for educators. Students learning mathematics must cultivate abilities like methodical, logical, creative, critical, consistent, and holistic thinking, along with sustainable problem-solving behavior. In mathematics education, it is essential for students to concentrate on problem-solving; therefore, the curriculum must be designed to enhance their problem-solving skills.

In the educational process, instructors play a crucial role in delivering content to ensure student comprehension. Basic statistics is one of the scientific areas within the graphics engineering study program. Fundamental statistics pertains to the utilization of mathematical principles essential for engineering students. The study of fundamental statistics is comprehensive; therefore, instructors require dynamic, accessible, and practical teaching resources to facilitate student comprehension of the content provided [1]. This prompted researchers to develop digital pocketbook teaching materials that encompass a summary of formulas and fundamental statistical concepts applicable by students throughout a semester, accessible via internet browsing.

Teaching materials are crucial and indispensable for learning, encompassing references to the topic matter being given. The availability of teaching resources serves as a reference for lecturers, facilitating the interaction in the educational process and the delivery of learning content. Educational materials should be crafted to enhance engagement and facilitate mastery

of the subject matter. Consequently, it is essential for a lecturer to comprehend all relevant material, not solely concentrate on the central issue, but also to master the foundational content to be delivered.

Mathematics pocket books designed as Android applications (APK) constitute an engaging and beneficial instructional resource [2]. Consequently, students can acquire knowledge autonomously. Students can retain greater information in digital pocketbooks due to their aesthetic appeal [3]. Digital pocket books offer advantages over printed versions, including enhanced interactivity, user-friendliness, accessibility, and the capability to present images, videos, and animations that facilitate more engaging study experiences. It is structured to enable students to study autonomously without instructor assistance and encompasses all essential elements of the aforementioned tools. Consequently, pocket books must elucidate the primary abilities that children have acquired, articulate them in engaging and compelling language, and include appropriate representation.

This research was driven by students' demand for realistic instructional resources applicable for study both in and out of the classroom. Accessible and practical teaching materials are essential for universal use, necessitating collaboration on digital resources that are easily obtainable for all learners, particularly in the challenging domain of mathematics. by the majority of pupils. Digital pocket books enable educators to leverage technology as a pedagogical instrument to enhance their mathematical expertise through electronic teaching resources, including audiovisuals, audio, films, and pertinent learning materials, aimed at facilitating comprehension and utilizing high-quality educational content [4]. Previous research on the development of pocket books has been conducted, including a study by Komarudin (2021) that indicates the developed pocket book is categorized as suitable for implementation, based on validation assessments from material and media experts [5].

Extensive research is currently focused on the development of pocket books, with the aim of creating a format that facilitates easier and more practical access to learning for students, regardless of their study location. This distinguishes this research from prior studies. Given this background issue, researchers want to ascertain the validity, efficiency, and effectiveness of digital mathematics pocket books in fundamental statistics courses inside the graphics engineering study program

2 Methodology

This study constitutes a form of research and development, wherein the investigation analyzes products as a concept employed in the creation of specific items and evaluates their utility. The research subject has produced a digital mathematics pocketbook for basic statistics classes. The study was carried out at the PSDKU Makassar Creative Media State Polytechnic, focusing on students enrolled in the graphics engineering department. The employed development model is a 4D framework encompassing the steps of definition, design, development, and distribution. The research tools employed included validation sheets, observations of lecturer learning management, observations of student activities, lecturer response questionnaires, student response questionnaires, and learning outcomes tests (THB). The data acquired using the aforementioned instruments will be subjected to quantitative analysis to ascertain the validity, practicality, and efficacy of the generated teaching materials.

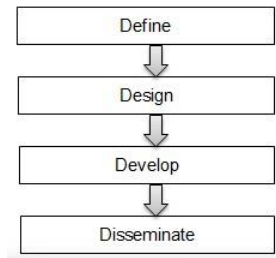


Fig. 1. The Model Development Of 4D

Table 1. 4D Development.

Phase	Activity	Time
Define	The aim of this stage is to determine, formulate and analyze learning needs. In product development, developers need to refer to development requirements, analyze and collect information on the extent to which development needs to be carried out	May
Design	The next stage of developing 4D learning media is the design stage. This design stage aims to design pocket book of materials, media and formats for prototyping materials is the main aspect of the design stage. At this stage the researcher also designed research instruments in the form of validity instruments, practicality instruments and effectiveness instruments	June
Development	The development stage is the stage for producing a development product. This development stage aims to produce pocket book teaching materials that have been revised based on expert input and trials with students	June
Disseminate	The aim of this stage is to disseminate pocket book teaching materials. In this research, only limited dissemination was carried out, namely by distributing and promoting the final pocket book product on a limited basis to mathematics lecturers	July

2.1 Define

The definition stage seeks to identify and articulate the requirements necessary for the learning process, while also gathering pertinent information regarding the pocket book product to be built. Currently, several activities are conducted, including problem analysis, student analysis, task analysis, idea analysis, formulation of learning outcomes, and objective analysis within the confines of the generated learning materials. Tsybulsky asserts that the define stage

necessitates a comprehensive examination from inception to conclusion, encompassing student profiles and evaluating learning objectives [6].

2.2 Design

Following the identification of the problem during the definition phase, the product design phase is subsequently executed. Upon completing the defining phase, the product can be prepared. Following the preliminary and conclusive analysis, student evaluations, materials, assignments, and learning outcomes, a preliminary product was developed in the format of a learning planning course book. The objective of this design phase is to create a pocketbook suitable for basic statistics classes

2.3 Development

During the development phase, two processes are conducted: expert validation and testing. Validation is conducted by specialists in mathematics education who seek feedback on the comprehensive content of the developed pocket book. Subsequently, it was evaluated by specialists in learning design to obtain feedback on the appropriateness of the created text material for mathematical education. Two types of validity are employed in the development of teaching materials: first, content validity, which evaluates the alignment of the materials with fundamental statistics learning; and second, construct validity, which assesses the appropriateness of the established development components. Simultaneously, in the field trial, educational activities were conducted utilizing a pocket book for fundamental statistics courses that had been established through expert validation, testing, and revision phases. This project was conducted with 19 students enrolled in the graphic engineering degree at the Creative Media State Polytechnic PSDKU Makassar. During the field trial phase, students receive a pocketbook link and complete a learning outcomes assessment at the conclusion of the course. The outcomes of the validation analysis are presented in Table 2 :

Table 2. Pocket Book Validation Test Results.

Measure Stage	Score	Interpretation
Graphic Validity	4.7	Very Valid
Language Validity	4.8	Very Valid
Construct Validity	4.9	Very Valid
Pocket Book View	4.8	Very Valid
The Total Of Average	4.8	Very Valid

Table 2 indicates that the graphic validity score is 4.7, the language validity score is 4.8, the construct validity score is 4.9, and the pocket book view score is 4.8, resulting in an overall average of 4.8. This indicates that the created pocket book falls into the highly legitimate category. According to study by Utami, all learning materials or technologies approved by specialists must be deemed valid. Wibowo and Pratiwi [12] Asserted that the instructional materials employed must possess valid criteria from expert evaluators to ensure their readiness for utilization. Furthermore, the resultant pocketbook may be utilized with small modifications to the validator. Revisions are implemented based on recommendations

provided by the validator, either communicated directly or documented in the suggestion column.

Table 3. Pocket Book Practicality Test Results.

Measure Stage	Score	Interpretation
Student Response Questionnaires	84.9	Positive
Lecturer Response Questionnaires	88.9	Very Positive

The student questionnaire response score is 84.9%, falling within the range of $80\% \leq RN < 100\%$, categorizing it as extremely favorable. The lecturer response questionnaire achieved a score of 88.9%, falling within the range of $80\% \leq RN < 100\%$, categorizing it as extremely positive. These two ratings indicate that the pocket book teaching materials utilized in basic statistics fulfill the practicality criteria.

Table 4. Pocket Book Effectiveness Test Results.

Measure Stage	Score	Interpretation
Lecturer's Ability Observation Sheets In Managing	4.62	Very Good
Student Achievement Test	89.58	Very Good

The Lecturer's Ability Observation Sheets in Managing Learning received a score of 4.62, falling within the interval of 4.5% to 100%, categorizing it as very good. Additionally, the Student Achievement Test score is 89.58, falling within the interval of $80\% \leq RS \leq 100\%$, categorizing it as very good. Based on these three scores, it can be determined that the pocketbook teaching materials utilized in basic statistics satisfy the efficacy criteria.

2.4 Disseminate

This phase involves utilizing pocket books that have been created for different subjects, such as those from other classes or institutions. The objective is to evaluate the efficacy of employing the pocket book across several subjects. Teaching materials are deemed effective if they yield favorable effects for student learning outcomes. Researchers disseminated pocket books on a restricted basis, specifically inside the Graphic Engineering Study Program at the Creative Media State Polytechnic PSDKU Makassar.

3 Conclusion

Based on the results and discussion of this research, pocketbook teaching materials on fundamental statistics were created via the 4D development paradigm, which encompasses the stages of define, design, develop, and disseminate. The validity assessment indicates that the average validity value of the pocket book is 4.8. The practicality test yielded student answer scores of 84.9 and lecturer response values of 88.9. The effectiveness test indicates that the lecturer's competency in managing learning is rated at 4.62, while the learning outcomes assessment yields a score of 89.58, so concluding that the pocket book satisfies the requisite

standards. legitimate, pragmatic, and efficacious standards. It may be concluded that the generated teaching materials for the basic statistics pocket book satisfy the requirements of validity, practicality, and effectiveness. Extensive research is currently focused on the development of pocket books, with the aim of creating a format that facilitates easier and more practical access to learning for students, regardless of their study location. This distinguishes this research from prior studies. The creation of pocket-sized instructional materials should be expanded to include more resources to enhance student engagement and interest in mathematics.

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