



Teaching Materials Development of Research-Based Learning Evaluation in Education Statistics Subject in The Faculty of Tarbiyah and Teaching Sciences at Raden Fatah State Islamic University of Palembang

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Abstract. This study aimed to (1) design and test the validity of the application of teaching materials based on learning evaluation research in the Education Statistics Subject; (2) test the practicality of implementing teaching materials based on Learning Evaluation research in the Education Statistics Subject; and (3) test the effectiveness of the application of teaching materials based on Learning Evaluation research in the Education Statistics Subject. The research was carried out with the research development procedure (RnD) of the Tessmer Model. The research data collection included observation, questionnaires, and interviews. The model development instrument was the *One to One* and field test questionnaires. The results showed that the teaching materials developed were valid, practical, and effective. Validation was carried out at the Expert Review stage with a score of 85 and *One to One* in the form of a score with an average of 98 and comments along with useful suggestions for revising teaching materials into prototype II. Teaching materials were also categorized as practical; this can be seen from the assessment of the results of the practicality questionnaire carried out in the Small Group in the form of a score with an average of 97. Furthermore, teaching materials of Research-Based Learning Evaluation in the Education Statistics Subject were categorized as very effective. This can be seen from the assessment of the results of the effectiveness test carried out on the Field Test in the form of a score with an average of 83 or all completed.

Keywords: teaching materials, research-based learning evaluation, education statistics

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INTRODUCTION

Evaluation in learning got a very important portion of the learning process. In the learning process, evaluation can be used as a tool in the calculation process to collect data in order to achieve class or group learning and then produce a decision. The results of the evaluation calculation were expected to encourage teachers to teach better and encourage students to learn better. So, evaluation provided information for the class and teachers to improve the quality of the teaching and learning process. The information used to evaluate the learning program must have the smallest possible error because evaluation was basically making judgment on the results of the assessment

Learning evaluation had an important role in the learning process which also determined whether the process was successful or not. According to Tyler (1986), evaluation was a process of determining the extent to which educational goals had been achieved. Evaluation was not only a collection of achievement of results through measurement, but evaluation was a process, starting from identifying outcomes and ending with decisions. *"Evaluation of pupil learning requires the use of number of techniques for measuring pupil achievement ... however evaluation is not merely a collection, it's process ... it begins with the identification of the intended learning outcomes and ends with a judgment"* (Gronlund & Linn, 1990). Stufflebam and Shinkfield (1985) defined evaluation: *"evaluation is the process of delineating, and providing descriptive and judgmental information about the worth and merit of some object's goals, design, implementation, and impact in order to guide decision making, serve needs for accountability, and promote of the involved phenomena"*.

In its implementation, learning evaluation had a mutualism symbiotic relationship with statistics. In calculating the results of assessments in learning, statistics was very much needed. Statistics in the sense of this context was science, namely science that discussed or studied and developed principles, methods and procedures that need to be taken or used, in the context of collecting, compiling, presenting, analysing information material in the form of numbers about something that was related to education (especially the

teaching-learning process), and drawing conclusions, making scientific estimates and predictions (in this case mathematically) on the basis of a collection of information in the form of numbers (Sudijono, 2018, pp. 1-9).

Therefore, statistics had a very important portion in science, so it was only natural that this science should be isolated into one subject. As in the Faculty of Tarbiyah and Teaching Sciences, Raden Fatah Palembang, statistics subject were available in all study programs under the faculty of education. It can be said; both evaluation and statistics had a very important portion in learning.

Based on preliminary observations, the implementation of evaluation learning had obstacles in the learning process. From preliminary observations of students of the Education Study Program of the Faculty of Tarbiyah and Teaching Sciences at UIN Raden Fatah Palembang, it was known that the following were: They generally had not mastered the evaluation material well. Ironically, they did not know much more about the role of evaluation in research. Most of them studied Evaluation not completely. Of the 36 students who were asked, only 12 (33%) applied evaluation material to the courses in the previous semester. In fact, evaluation material played a very important role in research, especially experimental research, RnD, and others.

LITERATURE REVIEW

The Nature of Learning Evaluation

Learning evaluation in brief can also be defined as the process of collecting information to determine the achievement of class or group learning and then producing a decision. The results of the evaluation are expected to encourage teachers to teach better and encourage students to learn better. So, evaluation provides information for the class and teachers to improve the quality of the teaching and learning process. The information used to evaluate the learning program must have the smallest possible error because evaluation is basically making judgment on the results of the assessment (Ismail, 2018, p. 12).

In its implementation, learning evaluation is closely related to measurement and assessment. According to Ismail (2018, pp. 13-14), measurement, assessment, and evaluation are hierarchical. Measurement compares the results of observations with numerical criteria, the assessment explains and interprets the measurement results, while evaluation is the determination of the value or implication of behaviour in which

There are decisions made such as complete/incomplete, increase/not increase or pass/fail. This hierarchical nature indicates that every evaluation activity involves assessment and measurement. Appraisal means judging something, whereas judging means making decisions about something by basing oneself on certain sizes or criteria.

Taylor said that the purpose of evaluation is to develop a policy that is responsible for education (Sudaryono, 2012). Mehrens and Lehman expressed their opinion that the purpose of evaluation is to help make decisions (Sudaryono, 2012). Daryanto (2008) states that educational evaluation is an activity that occurs in schools where teachers or teaching managers conduct assessments with the intention of whether the efforts made through teaching have been achieved or not. This means that the purpose of evaluation implies making decisions for students.

Furthermore, evaluation has an important role in education. Anas Sudjiono (2018) said about the evaluation function in general. Evaluation as a didactic action or process has at least five main functions, namely (a) diagnosis, (b) providing information, (c) material for determining the status of students (d) guidelines and (e) becoming an indication of program achievement. Specifically, the evaluation function in the education sector can be seen from three aspects, namely (a) a psychological perspective, (b) a pedagogical-didactic perspective, and (c) an administrative aspect.

From some of the above definitions about evaluation, it can be understood that evaluation activities are more complex activities in which activities are very systematic and include overall measurement and assessment at the start of a learning program until the end of the program. The most basic difference between measurement, assessment and evaluation is that evaluation leads to decision making based on measurement and assessment.

The Role of Statistics in Research

Statistics and research have a very close relationship, especially in the type of research that is quantitative in nature. The word "statistics" is defined as "a collection of information material (data), both in the form of numbers (quantitative data), not in the form of numbers (quantitative data) and not the form of numbers (qualitative data), which has significant significance and great use for a country. Meanwhile, Syafril (2019, p. 2) stated that statistics is the study of data collection methods, data presentation, and drawing conclusions. In subsequent developments, the meaning of the word statistic is limited to "a collection of

information material that is not in the form of numbers (quantitative data)" only; even information that is not the form of numbers (qualitative data) is no longer called statistics (Sudijono, 2018, pp. 1–9).

Furthermore, Sugiyono (2013) explains the statistical functions in research as follows: (1) a tool to calculate the size of the sample members taken from a population; (2) a tool to test the validity and reliability of the instrument. (3) Techniques for presenting data, so that data is more communicative. (4) Tools for data analysis such as testing the proposed research hypothesis. It can be concluded in this case the statistics used include correlation, regression, t-test, ANOVA and so on.

In line with Sugiyono, Irianto (2014, p. 6) explains the statistical functions in research as follows: (1) helping researchers to determine samples, so that researchers can work efficiently, but the results are in accordance with the object desired/studied; (2) helping researchers to read the data that has been collected, so that researchers can make the right decisions; (3) helping researchers to see whether there are differences between groups or the object under study; (4) helping researchers to see whether there is a relationship between one variable and another; (5) helping researchers in making predictions for the future and for the past; (6) helping researchers to interpret the collected data.

Seeing the role above, it can be concluded that statistics play an important role, especially in data processing. Data obtained from observations and from the results of a study before being presented to provide information, then the data must first be processed using certain statistical techniques in accordance with the type of research and the type of data generated from the research.

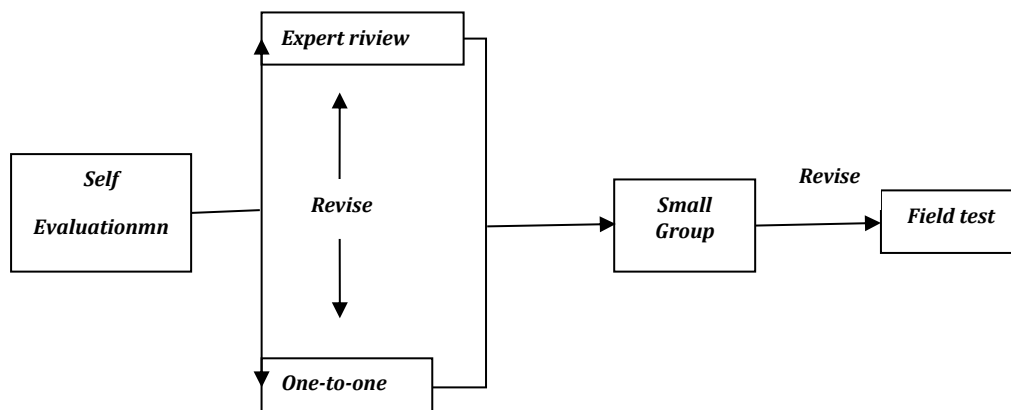
METHODS

This research was a research development (Research and Development) was a research method used to produce certain products. Research and Development (R&D) were a research method used to produce certain products and test the effectiveness of these products. Research and Development (R&D) were longitudinal or gradual. To be able to produce certain products, needs analysis research was used. Meanwhile, to test the effectiveness of these products, research was needed to test the effectiveness of these products.

As explained above, this development was to develop and produce teaching materials in the form of books. The form of the approach used was descriptive qualitative research. The use of descriptive research was because the researcher wants to describe the object as it was; there was no data manipulation so that the research results obtained are real in accordance with the actual data.

This study aimed to produce a design for developing research-based learning evaluation teaching materials in educational statistics subject. The location of the research was conducted at the Faculty of Tarbiyah and Teaching Sciences, Raden Fatah State Islamic University of Palembang. In this case the research subject was focused on the fifth semester students of the PGMI FITK Study Program at Raden Fatah State Islamic University of Palembang because the implementation of research-based lectures had been announced in this study program.

The development design used in developing this teaching material using a development model is Tessmer. Tessmer's development research focused on 2 stages, namely the *preliminary* stage and the *prototyping* stage using the *Formative evaluation* path. The *preliminary* stage consists of the preparation (analysis) and design stage, while the *formative evaluation* stage includes *self-evaluation*, *prototyping* (*expert review*, *One-to-one*, and *small group*), and *field tests*.



RESULTS AND DISCUSSION

Validity of Research-Based Learning Evaluation Teaching Materials in the Education Statistics Subject

Based on the research and development procedure of the Tessmer model, to develop the validity of teaching materials based on Learning Evaluation research in the Education Statistics Subject, it will go through the Formative Evaluation (Expert Review and One to One) flow stage, as in the following results.

Expert Review

At this stage the researcher evaluated the product of teaching material teaching materials based on Learning Evaluation research in the Education Statistics subject that had been designed and evaluated by the researcher so that it became prototype I, then validated by a validator or expert. The validation technique was asking experts (validators) to provide an assessment by filling out a validation questionnaire which included a design expert questionnaire, a material expert questionnaire, and a linguist questionnaire as well as providing comments and suggestions from the teaching materials developed. The results of the validation at the Expert Review stage were used as a basis for revising and perfecting the developed teaching materials.

Based on the results of the validation carried out by three experts through the Expert Review stage, teaching materials based on Learning Evaluation research in the Education Statistics Subject can be categorized as very valid (with the attached expert validation questionnaire). Following were the results of the assessment of the validation questionnaire sheet by three experts.

Table 1. Research Results of the Validation Questionnaire Sheet

Validator	Score	Category
Design Expert	81	Very valid
Linguist	82	Very valid
Material Expert	87	Very valid
Everage Score	85	Very valid

Validation Results Based on One to One

At this stage, teaching materials based on Learning Evaluation research in the Education Statistics Course that had been corrected and declared valid at the Expert Review stage were tested on students who were PGMI Study Program students.

In the One to One stage, students were asked to observe the teaching materials that had been developed. After finishing observing, students were asked to fill out the questionnaire sheets that had been provided. By paying attention to the results of the questionnaires that had been filled in by students, the researcher will find out whether the teaching materials that had been developed need to be improved or not. The following were the results of the *One to One* questionnaire from students. Here are the validation results with *One to One*.

Table 2. Assessment Results of the One to One Questionnaire

Name of Students	Score	Level of Validity
Ratna Sari Juwita	100	Very valid
Rani Setiawati	97	Very valid
Qurniaty	97	Very valid
Average	98	Very valid

Based on the validation results of the *One to One* questionnaire by peers, data were obtained: (1) the first assessment got an average score of 100 in the very valid category, (2) the second assessment got an average score of 97 in the very valid category, and (3) the third assessment got an average score of 97 with a very valid category.

Based on the results of the *One to One* questionnaire above, comments and suggestions were obtained for the need for revision of teaching materials that were developed after the teaching materials

had been validated by experts at the *Expert Review* stage and tested at the *One to One* stage, which would be used to revise or improve the prototype I became prototype II.

Test the practicality of teaching materials based on Learning Evaluation research in the Education Statistics Course

Based on the research procedures described in the previous chapter, the test of teaching materials based on Learning Evaluation in the Education Statistics Course was carried out by providing a questionnaire instrument to students as respondents. The purpose of the practicality test of the teaching materials developed was to determine the level of ease in understanding and using the teaching materials developed.

The practicality test of respondents to research-based teaching materials Learning Evaluation in the Education Statistics Subject was carried out by providing a questionnaire instrument. This practicality test will be tested in the *Formative Evaluation (Small Group)* flow.

At the *Small Group* stage, the teaching materials for the revised prototype II at the *Expert Review* and *One to One* stages will be tested in *small groups* consisting of 6 students with different abilities. This *Small Group* stage was held on October 14, 2019.

Students were asked to observe and work on the orders developed by the researcher. Then, students filled out the questionnaire that had been given. Researchers interacted directly with students to assist in filling out the questionnaire so as not to experience difficulties. Thus this can provide an opinion whether the teaching material needs to be improved or not.

At this *Small Group* stage, students seem to like the teaching materials being developed. This can be seen from the results of the student response questionnaire as followed.

Table 3. *Small Group Questionnaire Results*

Name of Students	Score	Level of Practicaly
Ratna Sari Juwita	98	Very practical
Rani Setiawati	97	Very practical
Qurniaty	96	Very practical
Lily Sonya Jelira	98	Very practical
Masnila	96	Very practical
Mega Pratiwi	97	Very practical
Average	97	Very practical

Based on the results of this validation, it can be concluded that teaching materials based on Learning Evaluation research in the Education Statistics subject got an average score of 97 in the very practical category.

The Effectiveness of Teaching Materials Based on Learning Evaluation Research in the Education Statistics Subject

To see the effectiveness of research-based teaching materials, Learning Evaluation in the Education Statistics subject used tests or evaluations. This evaluation was used to determine cognitive aspects only.

The evaluation was carried out on October 14, 2019. At this meeting a final evaluation was held to assess the learning outcomes of students which were used to see the effectiveness of the teaching materials developed.

In this evaluation, the researcher presented 20 multiple choice questions. This was intended to be able to measure students' understanding of the material that had been conveyed contained in research-based Learning Evaluation teaching materials in the Education Statistics Subject.

In the formative evaluation design stage, this stage was referred to as the field test stage. At this final stage, there were some students who got satisfactory scores and some who got poor grades. This value was obtained based on data analysis of students' learning outcomes calculated using the equation:

$$\sum KI = \frac{NK \cdot NK}{JPT \cdot JPT} \times 100$$

$$\sum KK = \frac{JSP \cdot JSP}{JSP \cdot JSP} \times 100\%$$

Information:

KI : Individual Completeness

NK: Cognitive Value

KK: Classical Completeness

JPT: The number of students who completed

JSP: The total number of students

The categories of completeness of student learning outcomes can be seen in the following table.

Table 4. *Categories of learning outcomes completeness*

Individual Completeness		Classical Completeness	
Score	Category	Percentage	Category
≥75	Complete	≥70%	Complete
<75	Incomplete	<70%	Incomplete

The data on the scores of students after working on the test questions at the *field test* stage were as followed.

Table 5. *Completeness Value at the Field Test Stage*

No.	Name of Students	Score	Information
1	Dewi Indriani	85	Complete
2	Dewi Wulandari	80	Complete
3	Diah Puspa Haini	75	Complete
4	Eka Ramadhanti	75	Complete
5	Evie Irawati	85	Complete
6	Fariza Eka Yulita	90	Complete
7	Heni Widari	85	Complete
8	Indah Pratiwi	90	Complete
9	Indah Rizki Meiguanti	90	Complete
10	Jamila Mandasari	95	Complete
11	Jenny Saskia Anjani	80	Complete
12	Lira Sonya Jelira	86	Complete
13	Masnila	75	Complete
14	Mega Pratiwi	76	Complete
15	Meina Pratiwi	80	Complete
16	Meissy Yolanda Putri	75	Complete
17	Ratna Sari Juwita	90	Complete
18	Nabilla Muslima	90	Complete
19	Nindi Widi Astusi	80	Complete
20	Novita Istiqomah	80	Complete
21	Novita Utami	85	Complete
22	Nur Izza Herrani	80	Complete
23	Nurizah	85	Complete
24	Oktariana Putri Rahmawati	80	Complete
25	Pitriani	90	Complete
26	Putri Ayu Ayesha	90	Complete
27	Qurniaty	80	Complete
28	A. Wasilla Titania Ranti	80	Complete
29	Rahmi Retni Herlyanti	85	Complete
30	Rani Setyawati	80	Complete

Total	2497	
Average	83	
Category		Effective

From the data obtained, it can be seen that in the field test stage above, the results of the evaluation of students in classical learning completeness can be achieved well. This was indicated by an average value of 83, which meant that the 100% completeness obtained by students was 30 people. This average can be categorized as effective because it had passed the passing grade limit of the subject, which was 70/C.

Based on the achievement of these values, it can be concluded that teaching materials based on Learning Evaluation research in the Education Statistics Subject were categorized as effective in achieving student learning outcomes. Thus, this product in the form of research-based Learning Evaluation teaching material in the Education Statistics Course can be used because it had gone through the stages of development to completion.

CONCLUSIONS

Based on the research results and research findings, it can be concluded as follows.

1. Research-based learning evaluation teaching materials in the Education Statistics course were categorized as valid. It can be seen from the assessment of the results of the validation questionnaire carried out at the *Expert Review* stage with a score of 85 and *One to One* in the form of a score with an average of 98 and comments along with useful suggestions for revising teaching materials into *prototype II*. Thus, it can be said that the developed teaching materials meet the valid criteria.
2. Learning evaluation teaching materials based on research in the Education Statistics Subject were categorized as very practical. This can be seen from the assessment of the results of the practicality questionnaire conducted in the *Small Group* in the form of a score with an average of 97. Thus, it can be said that the teaching materials developed meet practical criteria.
3. Teaching materials for research-based Learning Evaluation in the Education Statistics Subject were categorized as very effective. This can be seen from the assessment of the results of the effectiveness test carried out on the Field Test in the form of a score with an average of 83 or all completed/passed. Thus, it can be said that the developed teaching materials meet the criteria of being effective.

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