Development of Problem-Based Learning Devices with Cooperative Setting Scientific Approach in Accounting Learning

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***Abstract*: This research is development research that aims to develop a problem-based learning device with a scientific approach to cooperative settings in quality accounting learning (valid, practical, and effective). The application of learning by using this learning device can provide benefits in the form of mastery of Accounting Subject, improvement of scientific thinking skills, and the ability to cooperate. The process of developing learning devices using the 4-D (four D Models) model which consists of four stages, namely: (1) the stage of defining (2) the design stage (design), (3) developing stage, and (4) the stage of dissemination (disseminate). The research found that for the validity aspect, the results of the validator's assessment showed that the learning tools that had been developed, regarding the overall aspects had met the validity criteria. For aspects of practicality, the results of observations indicate that learning uses problem-based learning tools with a synthetic approach to cooperative settings that is well implemented at the time of testing and has met the criteria of practicality. For aspects of effectiveness, the results of the trial show that problem-based learning devices with a synthetic approach to cooperative settings fulfill 2 of the three indicators so that they meet the effectiveness criteria.**

***Index Terms*: Learning tools, problem-based learning, scientific approach, accounting.**

I. INTRODUCTION

A new paradigm in the application of the 2013 Curriculum for senior high schools in Indonesia requires a scientific approach and focuses on activeness and creativity for both students and teachers in the learning process. This curriculum allows students to develop themselves and demonstrate innovation and as part of the character development of students. The role of the teacher besides being a facilitator is also a facilitator that facilitates students to be able to learn and construct their knowledge. The paradigm is the constructivist view that students themselves must actively build their knowledge.[1]

Problem-based instruction (PBI) model is one of the learning models that can be applied to facilitate the implementation of the curriculum. This model is a reference for students to apply knowledge and skills in finding solutions to a problem. [2]. This learning model is fundamental to be developed in senior high school students because the focusing on the student's activity in the learning process or student-oriented character. The model evokes multi-directional interactions, social abilities and contains constructivism where learning is associated with students' real lives.[3]

The problem-based learning model can be integrated with the scientific approach. The 2013 curriculum mandates the essence of the scientific approach to learning activities. The scientific approach is expected to touch three cognitive domains, namely attitudes, knowledge, and skills. The scientific approach to learning as intended includes observing (questioning), questioning (reasoning), reasoning (associating), trying (experimenting), and forming networking. With the learning steps presented in the scientific approach, students are expected to deepen their understanding of the concept and not just memorize formulas but understand from the observations they are doing.

The success of the implementation of problem-based learning models with the scientific approach in cooperative settings depends on the role and readiness of the teacher, including learning tools. Based on the description above, in order to be able to apply a problem-based learning model with a scientific approach to cooperative settings, and learning objectives can be achieved, a learning device is needed by that learning.

II. RESEARCH METHODS

This research is research and development. The research design used was the design of the 4-D (four D Model) development model of Thiagarajan which consists of four stages, namely: (1) defining, (2) designing (3), (3) development (develop), and (4) the stage of dissemination (disseminate).[4]

The instruments used to collect data in the study are (1) observation sheet, (2) student response questionnaire, (3) evaluation sheet, and (4) validation sheet. Furthermore data from the validation results for each learning device were analyzed. The activities carried out in the process of analyzing the validity of learning devices are as follows:

- Recapitulate the results of expert assessment into the table which includes: (a) aspects (Ai), (b) criteria (Ki), (c) the results of the validator's assessment (Vji);
- Look for the average results of expert assessment for each criterion.
- Determine the category of the validity of each criterion. Validity category as follows:

$3.5 \leq M \leq 4$ ……very valid
$2.5 \leq M \leq 3.5$ …… valid
$1.5 \leq M \leq 2.5$ ……quite valid
$M \leq 1.5$ ……invalid

$3,5 \leq M \leq 4$ very valid
$2,5 \leq M < 3,5$ valid
$1,5 \leq M < 2,5$ quite valid
$M < 1,5$ invalid

$M = \overline{K_i}$ = to find the validity of each criterion
$M = \overline{A_i}$ = to find the validity of each aspect
$M = \overline{X}$ = to find the validity of all aspects

The criteria used to state the learning device has an adequate degree of validity is that the average value of validity for the overall minimum aspects is in the fairly valid category and the validity value for each minimal aspect is in the valid category. If it does not meet these criteria, it needs to be revised based on suggestions from the validators or by looking back at aspects that are of less value.

The analysis of the observations of student activities includes calculating the frequency of the aspects of each meeting by summing the frequency of the intended aspects divided by many students observed. Then calculate the percentage aspects of each meeting by dividing the average frequency of aspects of each meeting with the frequency of all aspects of the meeting multiplied by 100%.

Observations on the ability of teachers to manage learning are intended to measure the practical aspects of problem-based learning tools with the scientific approach of cooperative settings developed. To categorize the ability of teachers to manage to learn, use the categories in Table 1 below:

Table 1 Category of Teacher's Abilities in Managing Learning

Teacher's Ability Level	Criteria
0.00 ≤ tkg < 1.00	Not Good
1.00 ≤ tkg < 2.00	Less
2.00 ≤ tkg < 3.00	Enough
3.00 ≤ tkg < 4.00	Good
tkg = 4.00	Very Good

While the mastery data of students' teaching materials were analyzed quantitatively. Quantitative data analysis used descriptive statistics with the aim of describing students' understanding of accounting material after learning was carried out using problem-based learning tools with a scientific approach to cooperative settings. The ability of students can be grouped on a scale of five based on standard categorization techniques set by the Ministry of Education and Culture as in the following table:

Table 2 Categories of Mastery of Teaching Materials

Score Range	Criteria
85 – 100	Very High
65 – 84	High
55 – 64	Medium
35 – 54	Low
0 – 34	Very Low

III. Results And Discussion

Results of the Defining Phase

The defining phase is the process of defining the problem of the teaching and learning process in Accounting learning activities in class XII Makassar 6 High School. In this phase the researcher made five analyzes by describing in table 3.

Table 3 Description of Defining Phase

Phase	Description
Analysis process	1. Presentation of learning materials that do not provide sufficient opportunities for students to develop their abilities. 2. The development of problem-solving abilities, scientific thinking skills and the ability to cooperate are minimal. 3. The learning process did not develop student activity and enthusiasm
Student Characteristic	1. The age of students ranges from 17-18 years or the formal operational stage (Piaget's theory). This condition allows students to think abstractly, reason logically and draw conclusions from available information. 2. Students in Accounting learning tend to get teacher-centered learning. 3. The amount of material that must be learned by students results in lack of training so that they are more likely to expect to teach from the teacher, not to do independent learning. 4. Student learning outcomes vary, meaning that students' abilities are different, consisting of high, medium and low abilities.
Material Characteristic	1. Characteristics, accounting transactions, and trading company accounts, 2. Stage recording and definition accounting trading company, 3. Special journals for trading companies 4. Record transactions in the subsidiary and main ledgers. 5. Posting journals to ledgers for trading companies. 6. Trial balance and adjusting journal 7. Working paper on a trading company. 8. Reporting stage and closing of trading company accounting. 9. Cost of goods sold. 10. Cash flow statements and changes in capital reports 11. Closing journals, closing balance sheets, and reversing journals on trading companies. 12. Reports of closing the accounting cycle for trading companies
Specification of learning objectives	1. core competencies 2. basic competencies 3. learning objectives

Results of the Design Phase

The results of this stage are in the form of a preliminary design that includes two things, namely: (1) the initial design of the learning device, and (2) the design of the instrument that will be used to obtain data in the development process. Researchers developed learning devices in the form of (1) Learning Implementation Plans (RPP), (2) Student Books (BS), and (3) Student Activity Sheets (LKS). While the instruments designed include three types, namely: validity instruments, practicality instruments, and instruments of effectiveness, the validity instrument was designed in the form of RPP, BS, LKS, and THB validation sheets. Practical instruments designed in the form of Learning Implementation Examination Sheets. The instruments of effectiveness designed include (1) Student Activity Observation Sheet, (2) Student Response Questionnaire, and (3) Learning Outcomes Test.

Results of the Development Phase

The development stage is divided into validation activities and model trials. Validation is an expert assessment activity on an instrument prepared in the previous stage. These instruments are the Learning Implementation Plan, Student Book, Student Activity Sheet and Learning Outcomes Assessment Instrument. The results of instrument validation are presented in table 4.

Table 4 The Result of Instrument Validation Test

No	Instrumen	Asessment component	Score	Criteria
1	Learning Implementation Plan	formulation of learning objectives	3.78	Very valid
		Content	3.73	Very Valid
		language clarity	3.33	Valid
2	Student Book	Structure	3.67	Very valid
		material writing organization	3.80	Very valid
		Language	3.69	Very valid
3	Student Activity Sheet	Structure	3.73	Very valid
		material writing organization	3.73	Very valid
		Language	3.78	Very valid
4	Learning Outcomes Assessment Instrument.	Asesement of material	3.83	Very valid
		Content	3.67	Very valid
		Language	3.78	Very valid
		Time	4.00	Very valid

Table 4 shows that the four types of instruments are considered very valid by experts. This indicates that the model developed is feasible. Model testing is the stage of applying the learning model that aims to measure the effectiveness of the model and the practicality of the model.

The main purpose of the data analysis of the implementation of learning devices is to see the practicality level of problem-based learning devices with a scientific approach to cooperative settings. The implementation of learning devices is measured by observing the management of learning carried out by the teacher using the learning management observation sheet instrument. The results of observations / assessments of learning management are shown in Table 5 below.

Table 5 The Result of Practicality Test

No	Aspect	Asessment component	Score	Criteria
1	Learning activity	Preliminary	3.53	Good
		Core of learning	3.46	Good
		Ending	3.50	Good
2	Class Situation	Enthusiastic students	3,67	Good
		Enthusiastic teacher	3,75	Good
		Activities according to time allocation	3,42	Good
		Activities according to the scenario in the learning implementation plan	3,67	Good

The practicality test resulted that model shows good criteria or the teacher can apply the learning model by the characteristics set at the design stage of the model. Effectiveness test Learning devices are effective when fulfilling two of the three criteria, but the mastery criteria for teaching materials must be fulfilled. These criteria are (1) student activities, (2) student responses to the implementation of learning using problem-based learning devices with a synthetic approach to cooperative settings, and (3) mastery of teaching materials.

The results of the analysis of the effectiveness of learning devices especially aspects of student activity indicate that the activities of students in this trial do not meet the criteria. This test observed ten types of activities, and there were five types of activities carried out, and five other activities were not carried out.

The results of the analysis of student responses in the implementation of problem-based learning showed that there were 97.98% of students expressed pleasure in the learning device, atmosphere, teacher's appearance, and the way the teacher presented the material. Furthermore, there are 90.91% of students expressing their understanding of the problems presented in problem-based learning devices with a scientific approach to cooperative settings. Besides that, 93.94% of students expressed interest in learning by using problem-based learning tools with a scientific approach to cooperative settings, 100% of students stated that there was progress felt after learning with problem-based learning tools with a scientific approach to cooperative settings.

The results of descriptive analysis score student learning outcomes after learning by using problem-based learning tools with a scientific approach to cooperative settings seen in the following table.

Table 6 The Statistically Score of Learning Achievement

Variable	Statistic Value
Subject	33
Ideal Score	100
Mean	84.09
Median	85.00
Modus	85.00
Deviation Standard	3.18
Score Range	15.00
Maximum Score	90.00
Minimum score	75.00

Table 6 above shows that the scores on the learning outcomes of students of Class XII Makassar 6 High School obtained an average score of 84.09 with a standard deviation of 3.8 from the ideal score of 100. The minimum score obtained by students is 75.00, and the maximum score obtained by students is 90.00 with a score range of 15.00. The results of the frequency analysis showed that there were 33 people (100%) out of 33 students who obtained a minimum score of 75.00 or fulfilled the completeness requirements of learning.

Of the three effectiveness criteria, only two aspects were fulfilled in the trial, namely: student response and mastery of learning outcomes, while student activities did not meet the criteria. Based on the effectiveness criteria, it can be concluded that at the trial of learning device was effective because it fulfilled the two indicators.

Results of the Dissemination Stage

The deployment stage is carried out in the form of socialization of accounting teachers about learning devices that have been produced. The results of the dissemination, in the form of suggestions from teachers, are used to revise the learning device. Suggestions from participants of the socialization include: (1) description of the material associated with real life around students, (2) typing still needs to be observed. (3) note the attractiveness of the device, such as the cover should be colored, etc.

The results of the dissemination show that in general the tools that have been developed can be used in the broader scope after revisions are made based on suggestions from the teacher.

IV. CONCLUSION

The conclusions that can be drawn from the results of this development research are: (1) the process of developing problem-based learning tools with a scientific approach to cooperative settings in accounting learning through four stages of development, namely: (a) defining stage, (b) design stage, (c) the development stage, and (d) the deployment stage. The development process in the first three stages produces learning devices that have met the validity criteria, while the development process in the fourth stage is conducting testing and dissemination to produce learning devices that meet the criteria of practicality and effectiveness. (2) Obtained problem-based learning tools with a scientific approach to cooperative settings in accounting learning that have met the validity criteria, including (a) Learning Implementation Plans, (b) Student Books, (c) Student Activity Sheets, and (d) Results Tests Learn.

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