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Development of a Scaffolding Learning Strategy to Increase Student Learning Independence at SMK Muhammadiyah 2 Pekanbaru

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A B S T R A C T

This research aims to develop learning strategy scaffolding to increase student learning independence. Research uses methods Research and Development (R&D) ADDIE development model. This research was carried out at SMK Muhammadiyah 2 Pekanbaru on Fixed Assets material. Data was collected through 3 learning strategy experts and 2 material experts. Data analysis uses quantitative descriptive. The research results show that the strategy development instruments and materials created are valid and suitable for use in research. The results of product trials show that the development of learning strategy scaffolding effectively increasing student learning independence. Results pretest Learning independence shows that 55.18% of students are in the low category. Then post test shows 41.37% of students have high learning independence. Student learning outcomes also showed an increase and student responses showed that 59% of students chose learning strategy scaffolding is in the good and useful category. Thus it can be said that the development of learning strategy scaffolding increase student learning independence.

1. Introduction

The 21st century is a century that is very different from previous centuries. The extraordinary development of science in all fields in this century, especially in the field ofInformation and Communication Technology (ICT) which is sophisticated (sophisticated) makes this world increasingly narrower, because of the sophistication of ICT technology, various information from various corners of the world can be accessed instantly and quickly by anyone and from anywhere, interpersonal communication can be done easily, cheaply, anytime and anywhere (Tamil, 2019).

Globally 21st century skills are described in 4 categories as follows: (a) Ways of thinking: Creativity and innovation, critical thinking, solving problems, making decisions, and learning to learn; (b) Ways to work: Communicate and collaborate; (c) Tools for the job: General knowledge and skills of information and communication technology; (d) Ways to live: career, personal and social responsibility including cultural awareness and competence (Binkley, 2012).

It is necessary for educators to understand that the professionalism of educators in the 21st century is not merely expertise in a particular topic. Instead, they must be experts at finding out together with their students, know how to collaborate, and are experts at joining students to seek new discoveries in every learning process. 21st century skills are not just an educational product concept that students must have. However, 21st century skills are a driving force for educators, so that they consistently position themselves as role models for trust, openness, perseverance and commitment to their students in facing the realities of 21st century digital life. Educators are required to be aware of changing traditional learning approaches to digital approaches that are felt to be better. relevant in meeting student needs. The transition process from traditional methods to digital methods has various patterns depending on how educators and educational institutions concerned respond and adapt. (Prayogi, 2020).

This is in line with the government program which implements a new curriculum for education in Indonesia, namely the curriculumprototype. The prototype curriculum is a competency-based curriculum to support learning recovery by implementing project-based learning (Project Based Learning). (Kemendikbud, 2022) Curriculumprototype demanding that learning between students and teachers be carried out on a project basis certainly requires teachers to choose the right learning strategies so that learning is carried out well. However, in reality there are still many teachers who have not been able to implement it because there are many obstacles, one of which is that learning is still not conducive to learning in the post-Covid-19 era. Learning in the post-Covid-19 era makes it difficult for teachers to develop the learning they use.

This causes a reduction in students' knowledge and understanding of learning which will have an impact on student learning outcomes. One of the most felt impacts is the decline in students' abilities due to ineffective learning strategies and media used by teachers. The teacher has a role as a companion and facilitator who directs students in understanding the material. Teachers in delivering material need learning strategies. Pratiwi (2021) states that learning strategies are a systematic way of communicating lesson content to students to achieve learning goals.

Apart from the impact of learning strategies, another impact is the occurrencelearning loss to students.The Education and Development Forum in Revelation (2021) means thatlearning loss is a situation where students lose general or specific knowledge and skills or academic setbacks, which occur due to prolonged gaps or discontinuity of the educational process. According to research conducted by Andriani, et al (2021) learning loss What happens in online learning is: student interaction with students, student and teacher interaction and completeness of the learning material provided by the teacher. Apart from that, according to research conducted by Assiddiqi (2021), the learning processonline It also makes learning activities and experiences limited because you only get theory without applying it.

This causes a reduction in students' knowledge and understanding of learning which will have an impact on student learning outcomes. One of the most felt impacts is the decline in students' abilities due to ineffective learning strategies and media used by teachers. The teacher has a role as a companion and facilitator who directs students in understanding the material. Teachers in delivering material need learning strategies. Hardini (2012) states that learning strategies are a systematic way of communicating lesson content to students to achieve learning goals. One of the schools that felt the impact was SMK Muhammadiyah 2 Pekanbaru. Based onsurvey and interviews conducted by researchers with Accounting teachers at SMK Muhammadiyah 2 showed low learning independence, characterized by a lack of initiative and student motivation to learn, which was characterized by: 1) Students just waited for the teacher's explanation and did not want to ask questions. 2) Students are unable to monitor or manage their study time. This is characterized by students' lack of ability to control their learning activities, lack of ability to manage time seriously studying and still giving a large portion of their time to playing. 3) Students are unable to view difficulties as a challenge. This is characterized by students often complaining about the assignments and explanations given by the teacher.

The Scaffolding method is one solution that can be used to see improvements in students' physics learning outcomes (Hasmidyani, 2018). Apart from the problem of independent learning, another factor is that during learning, teachers still use explaining strategies or what is usually calledteacher centered where this is not in accordance with 21st century learning and the new development curriculum.One of the student-based learning strategies (student centered) is a learning strategy Scaffolding.

Scaffolding is a theory put forward by Vygotsky, which emphasizes the use of step-by-step support or assistance in learning and problem solving. This is in

accordance with the accounting material that will be used in this research, namely regarding depreciation of fixed assets. In this material the teacher can provide step by step assistance so that students learn and are able to complete the case study given by the teacher regarding depreciation of fixed assets. Starting from choosing a depreciation method and how to calculate book value which requires step by step in accordance with the development strategyscaffolding. In this research, the material used is fixed assets material in class XI financial accounting subjects (Sartika, 2020).

This research aims to look at the stages or steps in developing learning strategiesscaffolding using the ADDIE model, then to see the feasibility of developing learning strategiesscaffolding and to see the effectiveness of learningscaffolding in increasing student learning independence.

2. Methodology

The methodology is used in this research is development research to develop an effective product for school use, and not to test the theory. The development method in this research uses research and development (R&D) modified.

The development model used in this research is the ADDIE development model. The research was conducted at SMK Muhammadiyah 2 Pekanbaru majoring in financial and institutional accounting on fixed assets. The research instrument used validation sheets from learning strategy experts and material experts and student responses in the form of student response questionnaire data. A learning strategy is said to be valid if it achieves a score in the range of 61-80 as assessed by the validator and is suitable for testing in Figure1.

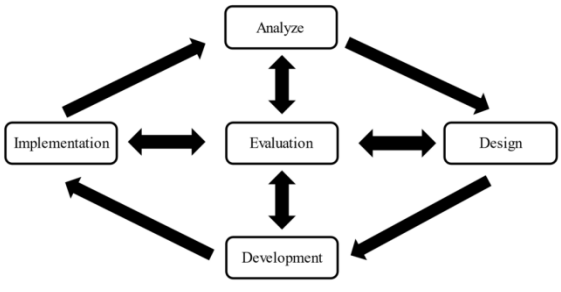

Figure 1. Design of ADDIE

Analysis of student response questionnaire data was carried out to see student responses to the development of learning strategies scaffolding through student response questionnaires. Then, to measure students' learning independence, a questionnaire was given pretest and post test. In the learning independence questionnaire there are 5 indicators divided into 11 questions. The types of questions in the instrument are positive and negative statements. The results of the assessment questionnaire will be analyzed in accordance with the assessment guidelines that have been developed. The test results will be analyzed quantitatively descriptively using percentage techniques, namely by finding the average value (mean) and percentage of success.

The SPSS test is carried out using the Paired Sample T-Test. The paired t-test is used as a comparative or difference test. This test is also called the paired T-test. The paired t-test is a parametric difference test on two paired data. In accordance with this understanding, it can be explained in more detail that this test is intended for a difference test or comparative test. This means comparing whether there is a difference in the mean or average of two paired groups. Paired means that the data sources come from the same subject. The paired t test (paired t-test) is a hypothesis testing method where the data used is not independent (paired). The characteristic most often found in paired cases is that one individual (research object) is subjected to 2 different treatments. Even though they used the same individuals, researchers still obtained 2 types of sample data, namely data from the first treatment and data from the second treatment.

3. Results and Discussion

a. Stages of Learning Strategy Development

Development research uses the ADDIE development model, namelyanalyze, design, development, implementation andevaluation. In this research, stages are carried out in sequence and evaluation is carried out at the end of the stages.

1.Analysis Stage (Analyze)

This stage aims to analyze the conditions and circumstances at the school where the research is carried out. The analysis activities carried out are as follows:

a. Initial Condition Analysis

The first stage is to analyze the initial problems of the accounting learning process in financial accounting subjects. This stage is carried out by observing the classroom atmosphere and interviews with subject teachers. The problem encountered at the beginning of the classroom

observations was the low level of student learning independence in terms of student activities and learning outcomes. Student activities that show a lack of student learning independence are:

a) Lack of initiative and student motivation to learn which is characterized by only waiting for the teacher's explanation and not wanting to ask questions.
b) Not able to monitor or manage their study time. This is characterized by students' lack of ability to control their learning activities, lack of ability to manage time seriously studying and still giving a large portion of their time to playing.
c) Students are unable to view difficulties as a challenge. This is characterized by students often complaining about the assignments and explanations given by the teacher.

From the results of observations, it was found that learning support facilities such as infocus, internet networks were adequate and students were allowed to use themsmartphone Schools should be able to create a comfortable learning atmosphere by using the right strategies. One of the right strategies is strategyscaffolding but in this research strategyscaffolding There was a little innovation in the second step where when the teacher should have provided the learning material it was replaced with the teacher guiding the students to find the material themselves. Development of learning strategiesscaffolding also assisted by the use of multimedia learning media which helps students find the learning material themselves which has been explained and provided by the teacher at the beginning. With this, it is hoped that students will be able to achieve learning goals easily.

b. Curriculum Analysis

According to Law. No. 20 of 2003: The definition of curriculum is a set of plans and arrangements regarding objectives, content and teaching materials as well as methods used as guidelines for implementing learning activities to achieve national education goals. Based on the field study carried out, it can be seen that the curriculum used by SMK Muhammadiyah 2 Pekanbaru is the 2013 curriculum.

The objectives of the 2013 curriculum are based on Minister of Education and Culture Regulation no. 36 of 2018 aims to prepare Indonesian people to have the ability to live as individuals and citizens who are faithful, productive, creative, innovative and affective and able to contribute to the life of society, nation, state and world civilization.. One system that must be formed to realize this goal is to implement a student-centered learning system. This kind of learning system requires students to think critically, foster creativity and increase students' learning activities in the classroom. In line with the student-centered learning system, it is of course also based on the Core Competencies and Basic Competencies that have been determined by the Minister of Education and Culture Regulation. The explanation of Core Competencies is also in line with the objectives of the 2013 curriculum.

Core Competency Analysis can be understood through the description of Basic Competencies which will become a reference in creating learning media to support the development of learning strategiesscaffolding.

2. Design Stage (Design)

Based on the results of the analysis in the first stage, it was found that a learning strategy was needed to increase student learning independence. The learning strategy needed is a learning strategyscaffolding with the following steps:

a. Intentionality. This activity aims to support students' learning activities by providing the assistance they need.
b. Suitability. This activity aims to help students solve the problems they face by providing the assistance needed.
c. Structure. The structure is also known asmodeling or questioning structured activities that have been arranged around an approach model that is appropriate to the task and leads to the student's work sequence.
d. Collaboration. Teachers and students work together and appreciate the results achieved by students. The teacher's role here is as a collaborator, not as an evaluator.

In this development stage, an evaluation is also carried out in the form of what steps should be added or replaced in the strategyscaffolding that already exists. Based on the evaluation results, the step developed in this strategy is the second step, where the teacher provides material and provides material to students, replaced by the teacher helping students find material with sources that have been limited by the teacher.

This research is also assisted by using learning media that has been prepared by the teacher, in this case namely audio video multimedia media in the form of learning videos which can be accessed by students viabarcode which has been prepared by the teacher.

3. Development Stage (Develop)

After doingdesign learning strategy that will be used, the researcher developed a learning strategy by modifying the learning steps to be as follows:

a. Intentionality Stage (Intentionality)
At this stage the teacher will explain the stages of learning activities that will be followed starting from material indicators to the learning objectives that will be achieved by students.
b. Suitability Level (Appropriateness)
At this stage the teacher will guide students to find learning materials by freeing them to choose their own learning sources.
c. Structural Level (Structure)
At this stage the teacher helps students build material through the facts they each find.
d. Collaboration Stage (Collaboration)
At this stage the teacher will carry out an assessment by giving questions in the form of case studies which will be displayed through learning media.

Development of learning strategiesscaffolding assisted by using audio visual media, namely learning video media created using an applicationtwencreft. Students just have to do itscan barcode as Figure 2.

Figure 2. Barcode

Scan This also applies to case studies regarding fixed assets given by teachers. Case studies are provided to measure student learning outcomes before and after using learning strategies *scaffolding*.

1. Implementation level

Implementation activities are carried out by means of limited trials in class by carrying out learning using strategies*scaffolding* which has been developed. This learning is carried out by subject teachers with material on fixed assets. At this stage, students' learning abilities are measured from independent learning using questionnaires and learning outcomes using case studies that have been prepared. The following describes the implementation of learning development research activities using strategies *scaffolding*:

a. On Monday 14 March 2022, a questionnaire was given*pretest* student learning independence using strategies *scaffolding*. At this stage, a questionnaire was deliberately given to see students' habits before using learning strategies*scaffolding* which was developed.
b. On Thursday 17 March 2022, the teacher provided the first material using learning strategies*scaffolding* which begins with providing fixed asset depreciation material. The learning process lasted for 6 lesson hours and was closed by providing LKPD to measure student learning outcomes after using learning strategies*scaffolding* which has been developed.
c. On Friday, March 18 2022, a questionnaire was given*posttest* and student response questionnaires after learning to use strategies *scaffolding* which has been developed.

2. Evaluation level

Evaluation activities in this research were carried out at each stage of strategy development. At the analysis stage, after planning and knowing the problems that will be developed, they will then be evaluated and then continue to the next stage*design* and*development* In this section, an assessment is also carried out regarding the suitability of the planned strategy and its development stage so that it is appropriate and does not lead to things that are not included in the development plan. At the implementation stage, evaluation activities were also carried out in the form of results from student worksheets collected by students. So at each stage of developing learning strategies, evaluation activities are carried out.

b. Feasibility of Learning Strategy DevelopmentScaffolding

a. Learning Strategist Validation

To validate the learning strategy developed, a validator consisting of 2 lecturers and 1 teacher who is experienced in learning activities is needed. The instrument validation journey can be seen through the data in the following Table 1.

Table 1. Learning Strategy Expert ValidatorsScaffolding

Validator	1	2	3
1	4949	7171	10100
2	6363	7373	8383
3	7373	8080	9797

1) The first meeting from validator one obtained 49 results with many notes of improvement, especially in the choice of sentences in the development step which had to be adapted to existing theory, the writing part was tidied up and other things were added. The second validator gave a score of 71 by including revisions to learning steps and imperfect writing. Then the third validator gave a score of 73 with revisions to the steps to guide students and synchronization of the sentences used. With these results, it was found that all three validators both wanted changes to the steps, writing and systematics of strategy developmentscaffolding.
2) At the second meeting, the first validator gave a score of 63 by including revisions to the sentences and grammar. The second validator gave a score of 73 with revisions to the writing section and paying attention again to the learning steps and materials to be used. The third validator gave a score of 80 with revisions to the layout and strategy development stepsscaffolding.
3) The first three validator meetings gave a score of 100 and stated that the instrument was valid. The second validator also gave a score of 83 and immediately signed the instrument's eligibility. The third validator gave a score of 97 and also stated that the instrument was suitable for use. From the results of the three instrument validations, it can be concluded that the strategy development instrument is suitable for use in research.

b. Material Expert Validation

Validation of Learning Material Instruments aims to validate the suitability of the materials and learning strategies used. The material used is Fixed Assets material which is validated so that the content of the material is in accordance with fixed assets material according to experts.

1. The first validator at the first meeting gave a score of 80 with notes on improvements to the accounting material and updates to writing numbers. The second validator gave a score of 65 with notes on updating the material and revising the writing procedures and selecting appropriate material. From the two validators above, it can be concluded that both validators both want the same materialup to date and newest in Table 2.

Table 2. Fixed Assets Material Expert Strategy Development Scaffolding

Validator	1	2	3
1	8080	8080	9393
2	6363	6565	9191

2. The first validator at the second meeting gave a score of 80 by making revisions by adding variations in example questions and improving sentences to make them easier to understand. The second validator gave a score of 65 with revisions to the grammar and material steps that need to be structured better.
3. At the third meeting, the first validator gave a score of 93 and approved the accounting material validation instrument. The second validator gave a score of 91. Thus, the material expert validation instrument is valid and suitable for use.

c. Effectiveness of Learning Strategy Development Scaffolding

1. Pretest Learning Independence

Based on the results of the questionnairepretest andposttest The learning independence of class XI students majoring in Accounting and Finance at SMK Muhammadiyah 2 Pekanbaru can be seen in the following Table 3.

Table 3. Frequency Distribution of Students' Learning Independence Pre-Test Results Learners

Category	Classification	Frequently	Percentage (%)
Low	21 – 27	16	55,18%
Middle	28–34	10	34,48%
High	35 – 39	3	10,34%
	Total	**29**	**100**

(Source : Data 2022)

From the distribution of the table above, it can be seen that student learning independence occurs at the beginning before the development of learning strategies is implementedscaffolding there were 55.18% of students who were in the low classification, namely 16 people. This is indicated by many students choosing the option of being less able to monitor themselves when

studying accounting. Then there is a lack of initiative in solving cases regarding accounting, especially financial accounting questions given by the teacher. There are only 3 people who are in high positions and feel they are able to monitor learning styles and are able to make the accounting questions given by the teacher into a challenge that must be solved.

2. Post Test Student Learning Independence

After carrying out limited trials using strategy developmentscaffolding which is assisted by multimedia-based learning media, then it is carried out nextpost test in the form of giving questionnaires to students in Table 4.

Table 4. Frequency Distribution of Students' Learning Independence Post Test Results Learners

Category	Classification	Frequently	Percentage (%)
Low	30 – 34	8	27,56%
Middle	35 – 39	9	31,03%
High	40 – 44	12	41,37%
	Total	**29**	**100**

(Source : Data 2022)

Based on the processed data above, it can be seen that the use of strategy scaffolding which has been developed to increase student learning independence. This can be seen in the results of the data processing where 41.37% of students or 12 people stated that strategy scaffolding able to make them carry out learning monitoring activities and able to make them challenge themselves in completing accounting tasks, especially on fixed assets material.

This shows that there is an increase in student learning independence in fixed assets material by using the development of learning strategies scaffolding with the help of multimedia media. While 27.56% stated that the use of learning strategy scaffolding has the same role as other strategies, namely that it is equally able to help them achieve their learning goals. And students in this category group consider strategy scaffolding does not significantly affect their learning independence, because they are able to monitor themselves in learning without the help of strategy scaffolding.

3. Student Learning Independence T Test Results

To measure the effectiveness of learning strategy development scaffolding A learning independence questionnaire was used which was distributed to students before and after the implementation of the limited trial in Table 5.

Table 5. Paired Sample T-Test Learning Independence

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre Test	-8,65517	2,75520	,51163	-9,70319	-7,60715	-16,917	28	,000

The Paired Samples Test table is the main output table that shows the results of the tests carried out. This can be seen from the significance value (2-tailed) in the table. The significance value (2-tailed) for this case example is 0.000 ($p < 0.05$). So the results of the initial test and final test experienced significant (meaningful) changes. Based on descriptive statistics of the initial test and final test, it is proven that the final test is higher. It can be concluded that the use of strategy development scaffolding can increase student learning independence.

a. Student learning outcomes

To measure students' learning outcomes abilities, questions are given pre test and post test and a different test (T-Test) was carried out and will be described in Table 6.

Table Paired Samples Test is the main table of output that shows the results of the tests carried out. This can be seen from the significance value (2-tailed) in the table. The significance value (2-tailed) for this case example is 0.000 ($p < 0.05$). So the results of the initial test and final test experienced significant (meaningful) changes. Based on descriptive statistics of the initial test and final test, it is proven that the final test is higher.It can be concluded that the use of strategy development scaffolding can improve student learning outcomes.

Tabel 6. *Paired Sample* T-Test Learning Result

Paired Samples Test									
		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Pre Test	-19,10345	7,34042	1,36308	-21,89559	-16,31130	-14,015	28	,000

b. Student Responses to Strategy Development

To see students' responses to the use of learning strategy scaffolding This is done by providing a questionnaire on student responses to the implementation of learning activities using learning strategy scaffolding.

Table 7. Frequency Distribution of Student Response Results on the Use of Learning Strategy Scaffolding

Category	Classification	Frequenty	Percentage (%)
Low	54 – 60	3	10%
Middle	61 – 68	9	31%
Good	69 – 75	17	59%
Total			**100%**

From Table 7, it can be seen that students' responses to the use of learning strategy scaffolding 17 people, namely around 59%, who were in the score range of 69-75 said strategy development scaffolding useful and in a good classification. However, there were 3 people who said developing learning strategy scaffolding considered less interesting and useful in the second step of the strategy scaffolding namely the structural part of the indicator, namely concluding material from various sources obtained.

Based on the results of the analysis above, it can be said that students respond well to the use of learning strategy scaffolding which was developed. This is also proven by increasing students' learning independence and learning outcomes after being given case studies. So from the results of the analysis above it can be concluded that the use of learning strategy development scaffolding effective and efficient in learning, especially accounting learning on fixed assets material.

4. Conclusion

Learning strategies Scaffolding developed using ADDIE development assisted by learning media in the form of learning videos tweencreft regarding fixed asset material. Stages of developing learning strategy scaffolding starting with conducting curriculum analysis and analysis of initial conditions before development is carried out. Then it's done design or learning strategy planning scaffolding. Validation is carried out by strategic expert validators and material experts selected through expert judgement namely the selection of expert validators through expertise in certain fields in education. Student learning independence after using strategy scaffolding increases and students are declared to have good learning independence by being able to monitor their respective learning activities and learning goals. Student responses to the use of learning strategy scaffolding shows positive results that indicate strategy development scaffolding useful and in a good classification. For accounting teachers, this learning strategy can be used to increase student learning independence in accounting material, especially in fixed assets material.

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