Learning effectiveness with seven jump method assisted with e-module on statistics problem solving

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Abstract. In this era of disruption, it is time to invite students to learn independently. This study applies a module-assisted Seven Jump learning model for class X students with statistics material. The research scenario begins with clarifying assignments, determining problems, and providing problems. The student's task is to analyze, evaluate needs to test hypotheses independently. This independent activity process is presented and delivered through an e-module. This study aimed to get effective learning, namely increasing student learning independence, the positive influence of independent learning to the achievement of problem-solving abilities, and the problem-solving abilities achieve learning completeness. This experimental quantitative research with the scope of class X statistics material with the variables of students' learning independence and problem-solving abilities. Data obtained by observation and tests and processed by increasing N-Gain analysis, regression test and t-test completeness. The results showed that students with independent learning through the Seven Jump stages that have been packaged in e-modules condition the students to solve problems by discussing, looking for additional literature to test hypotheses. It is proven that the students' learning independence has increased, the N-Gain value is 1.4, and it influences problem-solving ability by 72%. From the test of learning outcomes, the students' problem-solving abilities reached an average of 77, exceeding the completeness score of 70. Thus the effectiveness of learning was achieved.

1. Introduction

Educators play an essential role in delivering character and achievement to students [1-2]. Students must be brought in a pleasant learning atmosphere and given the broadest possible opportunity to learn independently or accompanied by assistance [3-4]. The current curriculum demands that students lead to scientific learning by observing, asking, reasoning, and communicating, presenting their results [5][6].

Current field conditions indicate that learning in schools is still teacher-centered [7-8]. This gives the impression that students are still very dependent on the rhythm of instructions given by the teacher. Students work like mechanics who do descriptive statistical calculations but they could not be interpreted the meaning of each data output.

This research is learning research that combines the module-assisted Seven Jump learning model and is implemented online. The Seven Jump method is developing the Problem Based Learning (PBL) approach [9-10]. Syntax stages The seven steps of the Seven Jump learning include: 1) Identify and
clarify unfamiliar terms presented in the scenario; 2) Define the problem or problems to be discussed; 3) Brainstorming session to discuss the problems; 4) Review step 2 and step 3 and arrange explanations into tentative solutions; 5) Formulate learning objectives; 6) Private study; 7) Group shares results of private study [10-11]. Furthermore, the implementation of module-assisted learning is intended so that all subject matter and its explanations are detailed incomplete reading, accompanied by material summaries, practice questions, to answer keys. The provision of these modules allows students to learn independently [12-14].

Meanwhile, learning with E-learning is a learning system that utilizes information technology as a means for the teaching and learning process, which is carried out online [15-16]. E-learning benefits are: 1) providing flexibility in access to teaching materials, 2) independent learning to control the success of learning, 3) providing cost efficiency. E-Learning systems enable improved communication between and among students and between students and instructors [17]. By getting used to learning through the e-learning module, it is hoped that it can increase students' independence. The results also show that there is a correlation between learning habits and metacognitive skills in achieving learning goals [18].

Based on the aforementioned learning studies, this research scenario is designed interactively with learner-centred activities. The activity steps are designed by inviting students to independently study the statistical material that has been packaged in an e-module. The teacher provides the widest possible opportunity for students to learn to do science according to the demands of the curriculum. Students are faced with a problem. With the Seven Jumps steps that start with studying and looking for relevant terms, formulating problems, discussing with friends to come up with generating hypotheses. The next stage is to prove by exploring scientific support, by learning from e-modules to getting material to be presented when communicating in the classroom community with teacher assistance. Finally, students present the results of the discussion towards the scientific confirmation they have.

On the basis of the scenario design as mentioned above, the research objectives can be formulated as to get effective learning which is characterized by 1) the problem solving ability of the experimental class achieving a standard score of 70, 2) the independent learning of students has a positive effect on the achievement of problem solving abilities, 3) deepening through selected students (high, medium and low ability) there will be an increase in their learning independence. The results of this study are expected to provide benefits: for students to be able to build an independent learning mindset and teachers can position themselves as learning facilitators with the help of e-learning module media.

In principle, this research road map deepens the learning process of a student to reach the problem solving ability of statistical concepts which is built from the process of independence. Building learning independence must be assisted by adequate learning facilities and infrastructure, especially modules [4][13][19-21]. High school students in order to develop their learning independence still need assistance or scaffolding from the teacher or instructor, namely a place to ask questions if students learn the concept through modules [22-23]. The importance of building the character of learning independence from within which is grown with habituation can bring students to solve problems and problems [24-29].

This research scenario assigns students to be faced with a problem until they formulate a hypothesis and finally go through discussions with their friends online to prove the hypothesis. This assignment invites students to study independently actively. This activity is carried out every topic that must be studied. Of course this will lead students to increase their independent learning. Thus it can be formulated this research hypothesis to achieve effective learning.

2. Methods
The design of this research is experimental quantitative research. This research method is used to test the effectiveness of learning. The population in this study were students of class X SMAN 14 Semarang consisting of 4 classes. With the cluster sampling selected class XB as the research sampling. Student learning independence (x) as the independent variable and mathematical problem solving ability (y) as the dependent variable. To deepen student activities in this learning and see the increase in their learning independence, 3 students who have low, medium and high ability backgrounds were selected. With
triangulation (observation, in-depth interviews and document collection) to obtain learning independence data.

Observation indicators on variable x include independence in preparing material, looking for additional literature, processing coordinating tasks, working on discussions, completing assignments with the learning environment, delivering learning outcomes, completing assignments. Furthermore, indicators of problem-solving abilities include problem identification, determining goals, working on solution steps, concluding the results. Data x is taken through observation, y through tests. The data were processed by t comparative test analysis, regression effect test and increase test with Gain.

3. Results and Discussion

3.1. Research result

With the application of the assisted seven jump learning e-module carried out online, the data obtained from observations about independent learning through interviews with 3 students for 5 consecutive meetings with an average score of 3.2; 3.5; 3.8; 4.2; 4.6; indicates an increase in their learning independence. Processed with the Gain test obtained an average score of 0.3 which indicates a fairly good increase.

The results of the observation of learning independence as a whole during learning obtained x data, and at the end of the lesson the problem-solving ability was measured y. Processed the effect of x on y with regression analysis obtained a regression equation $y = -32.4 + 1.4x$, and the magnitude of the influence is 72%, indicating a fairly strong influence. Furthermore, obtained an average of $y = 77$ and processed by the comparative test t obtained significantly that y reached exceeds the completeness limit of 70. Based on the results of data processing obtained all three conditions are met. So the learning effectiveness is achieved.

3.2. Discussion

The effectiveness of learning using the seven jump method assisted by e-module implemented online has been achieved. This achievement started from a struggle with mentoring to strengthen students' independent learning. This happens because the seven jump stages are applied in the health sector and are now being tried in the field of mathematics education. The atmosphere of learning online is more difficult, especially when the teacher directs students to study independently, the opportunity to ask questions or discuss is also not as smooth as face-to-face. There are still many students how to learn depending on private tutors [30]. However, the condition of the Covid-19 pandemic has forced students to study independently [31]. Online learning solutions to break the chain of Covid-19 spread using e-modules are a good step. E-modules that have been designed to be complete and easy to learn can help students learn.

The difficulties at the beginning began with the assignment of studies to look for related terms to formulate problems, it turned out that low-ability students were still unclear when reading the e-module. Meanwhile, students with moderate and high abilities have been able to carry out these activities independently. With the help of scaffolding, students whose abilities are less gradually become clear too. The next exercise step occurs when bringing students to prove the temporary solution concept. Likewise, this difficulty is experienced by students with low abilities. In this way, peer tutors when discussing between friends can also take them to their destination.

The results of data processing proved that the learning was effective. These results are in line with research [32] [25] increasing students' mathematical problem-solving abilities influenced by various factors including: learning provided by the teacher, the media used, and the conditions of learning. In this study, learning is applied which requires students to learn independently so that it will affect their ability to solve mathematical problems independently[33][34][35][36].

This is where it can be analyzed that independent learning built from e-module assistance has proven to be effective in its implementation. Students are proven to be able to keep trying to explore every material available in the e-module . The habits of students who initially were still dependent on other
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Learning mathematics using the Seven jump method assisted by e-modules programmed by online e-learning has been proven to be able to encourage and encourage students to learn independently. With e-modules able to encourage students to get rid of their dependent learning habits, even though online learning makes communication between teachers and students very minimal, but with the spirit of independent student learning assisted by e-modules can deliver student learning success. Application of the steps of this research scenario helps students understand problems, formulate problems, look for concepts or terms related to discussion to formulate hypotheses that continue to be explored through discussions between students to find solutions to the problems faced.

4. Conclusion and Suggestion
The implementation of learning mathematics using the Seven Jump method assisted by e-modules is effective which is marked by:
1. The learning independence of students has a positive effect on the achievement of mathematics problem solving abilities in the statistical material by 72%, indicating a large contribution.
2. Based on the results of the deepening of learning independence in low, medium and high ability students there is an increase with an increase in the gain value of 1.4. This shows a high increase in learning independence.
3. The learning outcomes in this learning, namely the ability to solve problems in statistical material reach an average of 77, statistically test results show that the achievement exceeds the 70 completeness standard

Based on the research results with the above conclusions, suggestions can be made:
1. Learning for students in this pandemic period is carried out online, it will be very helpful to provide an e-module that contains complete learning materials so that it can give students the opportunity to learn independently more freely.
2. Learning that provides experience independently gives success to students. Therefore, teachers should be able to choose the appropriate learning method according to the characteristics of the teaching material and also the characteristics of students in learning.
3. Teachers in implementing online learning should really prepare teaching materials that have been written in the form of e-modules and communication with students is scaffolded according to the needs of the characteristics of students.

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