Application of Direct Instruction Model in Basic Network and Computer Subjects to Improve Student Learning Outcomes

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ABSTRACT
The learning outcomes of grade X students of the Department of Networks and Computer Technology of SMK Negeri 5 Gorontalo in Basic Network and Computer subjects learning have not achieved optimal results. One of the causes of this condition is the application of a teacher-centered learning model which results in a lack of student involvement in the learning process. This study aims to apply the Direct Instruction Model using the Cisco IT Essential Virtual Desktop Application to improve student learning outcomes. The method used in the study is a class action method that is carried out in two cycles, namely cycles 1 and 2. Each cycle uses the Kemmis and McTaggart model which consists of four stages: planning, implementing actions, observation, and reflection. The results showed that in cycle 1, the percentage of student learning outcomes that succeeded reached 67.92%. However, this achievement has not met the expected percentage of learning outcomes of 80%, so research still needs to be continued in cycle 2. Furthermore, in cycle 2 there was an increase in the percentage of student learning outcomes that managed to reach 84.3% and had met the minimum expected percentage of learning outcomes of 80%.

Keywords: *Direct Instruction Model, Student Learning Outcomes.*

1. INTRODUCTION

Learning as a process of interaction between students and their environment so that there is a change in the behavior of students in a better direction, requires the role of the teacher to coordinate the environment to support the change in behavior. Learning is a conscious effort of educators to help students so that they can learn according to their needs and interests. Educators act as facilitators who provide facilities and create situations that support the improvement of students' learning abilities. [1]. The learning model refers to the learning approach that will be used, including teaching objectives, stages in learning activities, learning environment, and classroom management. The development of appropriate learning models aims to create learning conditions that enable students to learn actively and happily so that students can achieve good learning outcomes and achievements.

Learning outcomes are all skills and results achieved through the teaching and learning process in educational institutions/schools which are determined by numbers that are measured based on learning achievement tests [2]. SMK Negeri 5 Gorontalo is one of the vocational schools that periodically evaluates student learning outcomes. Based on the preliminary study, it is known that most of the learning outcomes of class X students in the Computer and Network Technology Department achieved a Minimum Pass Criteria score of 70, both in the cognitive and psychomotor domains. The results of observations show that the low student learning outcomes are caused by internal student factors, namely the lack of active students in learning, and learning approach factors.

Improving learning outcomes can be done by optimizing the use of appropriate learning models for students. Direct Instruction is a teaching model that is Teacher Center. There are several studies showing that there is an increase in student learning outcomes who receive learning with the Direct Instruction model compared to using conventional learning methods [3-5]. Direct learning is a learning model where activities are focused on academic activities so that in the implementation of learning activities the teacher

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exercises strict control over student learning progress, utilization of time, and class climate which is also strictly controlled [6]. In applying the direct learning model the teacher must demonstrate the knowledge or skills that will be trained to students in stages by using demonstration and question and answer methods. The instructional media and learning method that match with learning material so influence toward student outcomes [7]. The demonstration method is a way of presenting lessons in which the teacher shows students a certain process that is being studied or steps using learning media that are relevant to the subject matter or material being presented or directly. While the question-and-answer method is a way of conveying lessons in the form of questions from the teacher to students and students answer these questions or vice versa.

Integrating digital learning into class teaching does not simply benefit students, but teachers would also have different gains [8]. In learning, interactive learning media is also needed which is able to increase student learning interest. The interactive learning media used is the Cisco IT Essential Virtual Desktop application. Cisco IT Essential Virtual Desktop is a simulation application as an interactive media for Computer Assembly subjects which is very easy for students to understand because it is very easy to use coupled with complete hardware pictures and explains hardware components in detail with supporting menus [9].

This study aims to apply the Direct Instruction model to the Computer and Basic Network subject with the subject of Computer Assembly and to determine the increase in learning outcomes of class X students majoring in computer and network technology at SMK Negeri 5 Gorontalo after applying the Direct Instruction model using the Cisco IT Essential Virtual Application desktop. The results obtained in the study can add to the knowledge and information for teachers and prospective teachers in choosing the learning model to be used, especially the application of the Direct Instruction learning model using the Cisco IT Essential Virtual Desktop learning media.

2. RESEARCH METHODOLOGY

2.1. Research Design

This research is a Classroom Action Research. Classroom Action Research simply means research conducted in a class to find out the results of actions applied to a subject research in the class[10]. The research using two cycles, each cycle using the Kemmis and Mc Taggart models. Each cycle consists of four stages, namely planning, action, observation, and reflection. The stages of the research are one cycle carried out in one lesson. Model Kemmis and Mc. Taggart combines the implementation stage of action research with observation because the observation stage is carried out when the implementation stage of research action is in progress [11]

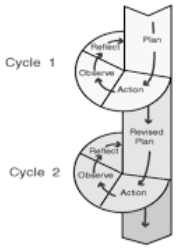

Figure 1 Kemmis and Mc Taggart model.

Based on Figure 1, it can be seen that the Kemmis and Mc Taggart model cycle starts from the stages of planning, implementing actions, observing, and reflecting which are repeated in the next cycle.

2.1.1. Plan

Planning is the initial stage in implementing classroom action research. Planning, namely developing forms of action as problem solving starting from preparing research instruments, teaching materials, learning implementation plans, and learning media

2.1.2. Action

The implementation stage of the action is the implementation of the planning stage that has been previously designed. In the action stage, the researcher conducted research in 2 cycles, each cycle consisting of 1 learning meeting.

2.1.3. Observe

The observation stage was carried out during the implementation stage of the action. In the observation stage, the researcher made observations to assess student learning outcomes in terms of knowledge and skills

2.1.4. Reflect

The reflection stage is the stage carried out to find out about the changes that have occurred or the results obtained after the implementation of the research action is carried out. Then the results of reflective thinking are used as a basis for determining the implementation of research actions in the next cycle.

2.2. Research Method

2.2.1. Research Data

The research was carried out using quantitative methods so that the data collected included information about the students' condition seen from the aspect of

quantitative data. Quantitative data in this study are the results of the implementation of research actions in both cycle I and cycle II in the form of data from the calculation of the average value and the percentage of student learning outcomes that achieve the minimum passing criteria of 70.

2.2.2. Population and Sample

The population is all the data that concerns us in a scope and time that we specify [12]. Population can be expressed as a collection of objects or research data sources [13]. The population in a study is a collection of objects that are a source of research data, where there is information you want to know. The population used in this study were all class X students majoring in computer and network technology at SMK Negeri 5 Gorontalo, totaling 54 students.

The sample is part of the population to be studied. The sample is part of the population that is the center of research attention, within the scope and time that we specify [13]. The sample is part of the research population or a sample of the entire research population [14]. The sample in this study were students of Class X majoring in computer and network technology which totaled 26 students. Sampling was carried out using a purposive sampling technique with the consideration that in this sample there were some students whose learning outcomes had not yet reached the Minimum Passing Criteria. Purposive sampling is a sampling technique used by researchers if the researcher has certain considerations in taking the sample [15].

2.3. Data Analysis Technique

Data analysis was carried out with the aim of knowing the increase in learning outcomes of class X students majoring in computer and network engineering in the aspect of knowledge and skills on the subject of Computer Assembly. The quantitative data used is data on the results of conducting research actions in both cycle I and cycle II through analysis of learning outcomes data. Analysis of learning outcomes data is used to calculate the average value and the percentage of student learning outcomes that achieve the minimum passing criteria. Analysis of learning outcomes data is carried out with the following steps:

1. Calculate the average value by adding up the learning outcomes of all students, then dividing it by the number of students in the class, as in Equation (1):

$$Average\ Value = \frac{\sum N}{\sum S} \quad (1)$$

Where:

$\sum N$ = Total value of all students' learning outcomes

$\sum S$ = Number of students

2. The percentage of learning outcomes is calculated by adding up the scores of all students who have achieved the minimum passing criteria, then dividing it by the number of students in the class, as in Equation (2):

$$\text{Percentage of learning outcomes} = \frac{\sum L}{\sum S} \times 100\% \quad (2)$$

Where:

$\sum L$ = The total value of all students who achieve the minimum passing criteria

$\sum S$ = Number of students

In this study, the standard for achieving the expected percentage of learning outcomes is 80%.

3. RESULTS

3.1. Preliminary Observation Results

Based on the list of grade X students majoring in computer and network technology at SMK Negeri 5 Gorontalo in cognitive and psychomotor aspects on the subject of Computer Assembly prior to remedial implementation, it is known that student learning outcomes are still very low and there are still students who have not reached the minimum passing criteria of 70 Of a total of 26 students, there were 14 students who completed with the highest average score of 83, and 12 students who had not completed with the lowest average score of 40.

The identification results show that this is caused by internal student factors, namely the lack of active students in learning, and learning approach factors. Based on observations of the learning process and interviews with students in class, it is known that the learning model used is too monotonous which makes students feel bored in learning Computer Assembly. Furthermore, the application of the Direct Instruction learning model was carried out in this classroom action research using two cycles, each cycle using the Kemmis and Mc Taggart models. Each cycle consists of four stages, namely planning, action, observation, and reflection.

3.2. Cycle 1

3.2.1. Cycle 1 Planning

The planning stage of cycle I is carried out by preparing the necessary tools to carry out the actions of cycle I. In this case, what is carried out in the planning stage includes:

1. Develop a learning implementation plan.
2. Arrange the material
3. Make essay questions as many as 5 numbers.

   The essay questions are as follows:

   1. What is meant by computer assembly? (score 20)
   2. Briefly describe the basic function or role of the motherboard in assembling a computer. (score 10)
   3. Name and explain the components of a computer assembly that you know. (Score 30)
   4. Explain the meaning of Cisco IT Essential Virtual Desktop. (score 20)
   5. Describe Cisco IT Essential Virtual Desktop Functions. (score 20)
4. Make assessment instruments in the form of knowledge assessment sheets and skills assessment.
5. Copy the Cisco IT Essential Virtual Desktop application master on all computers in the Laboratory.
6. Install the Cisco IT Essential Virtual Desktop application on each computer in the Laboratory

3.2.2. Cycle 1 Action

Actions in cycle I carried out one learning meeting with the allocation of learning time (4x45 minutes). In the action cycle I, practicum evaluation and essay test were carried out. Learning steps This learning process refers to a lesson plan that has been prepared using the Direct Instruction learning model. In the learning implementation plan, there are 3 stages, namely the preliminary stage, core activities, and closing.

The syntax of the Direct Instruction model that is used in the learning plan in the preliminary stage is orientation, learning begins by greeting, giving directions to the class leader to lead the prayer, checking student attendance, and conveying learning objectives that are conveyed orally. In the core activities, presentations and demonstrations are carried out, independent practice under guidance, presentation of Computer Assembly material and questions and answers with students. A direct demonstration of the steps for assembling a computer was also carried out using the Cisco IT Essential Virtual Desktop application and asking students to follow these steps. Then students are directed to carry out independent practice under the guidance of researchers to check students' abilities before evaluation is carried out. After that, a practicum evaluation is carried out to assess the competency skills of students. Practicum evaluation is carried out by calling 5 students according to the order of absences and alternately. When the practicum evaluation took place, students were assessed through the Cisco IT Essential Virtual Desktop application practicum. Then proceed with evaluating the competence of students' knowledge through essay test questions totaling 5 (five) numbers. Essay test questions will be given to students who have completed a practicum evaluation.

In the closing stage, a question and answer session was held regarding material that was not understood and the steps to assembling a computer using Cisco IT Essential Virtual Desktop. So that this is used as a reflection to find out the extent of students' understanding of learning Computer Assembly using Cisco IT Essential Virtual Desktop.

3.2.3. Cycle 1 Observation

The observation stage was carried out during the implementation stage of the action. In the observation stage, the assessment of learning outcomes is used through the evaluation of essay questions for the cognitive domain. While the psychomotor assessment is through an evaluation of the Cisco IT Essental Virtual Desktop application.

Student learning outcomes in cycle I in the subject of Computer Assembly produced an average value of 78.5. Of the 26 students, there were 21 students who succeeded in achieving the minimum passing criteria with the highest score of 85, and 5 students who had not yet completed with the lowest score of 68.5. The percentage of learning outcomes obtained in the first cycle was 67.92%.

3.2.4. Cycle 1 Reflection

Data in cycle 1 shows the average value of learning outcomes reaches 78.5. It was concluded that there was an increase in the first cycle compared to the average value obtained in the initial observation, namely 68. The percentage of student learning outcomes that succeeded in achieving the minimum passing criteria in the first cycle reached 67.92%. However, these achievements did not meet the expected learning outcomes percentage of 80%, so the research was continued in cycle 2.

3.3. Cycle 2

3.3.1. Cycle 2 Planning

Learning planning and materials in cycle 2 are the same as those in cycle 1. The purpose of planning cycle 2 is to further enhance students' potential in learning computer assembly.

3.3.2. Cycle 2 Action

Cycle 2 action was carried out in one meeting with an allocation of learning time (4x45 minutes). In the second cycle of action, practicum evaluation and essay questions were carried out. Learning steps This learning process refers to a lesson plan prepared using the Direct Instruction learning model. There are 3 stages in the lesson plan, namely the preliminary stage, core activities, and closing. All stages and steps carried out are the same as in cycle 1.

3.3.3. Cycle 2 Observation

As in cycle 1, the assessment of learning outcomes in the cognitive domain is carried out through essay questions. While the psychomotor assessment is through a Computer Assembling practice test using the Cisco IT Essential Virtual Desktop application.

The average value of student learning outcomes in cycle 2 is 84.3. In cycle 2, all students succeeded in achieving the minimum passing criteria with the highest score of 91 and the lowest score of 79. The percentage of learning outcomes obtained in cycle 2 is 84.3%.

3.2.4. Cycle 2 Reflection

Based on data in cycle 2, the average value of learning outcomes reached 84.3. It can be concluded that there is an increase in student learning outcomes in cycle 2 compared to cycle 1. The percentage of student learning outcomes in cycle 2 is 84.3% and it achieves the minimum passing criteria. So that in cycle 2 it has fulfilled the expected percentage of learning outcomes which is equal to 80%. So the research objectives have been achieved.

4. CONCLUSION

Student learning outcomes on the subject of Computer Assembly after applying the Direct Instruction learning model using the Cisco IT Essential Virtual Desktop application learning media in this class action research, showed that there was a complete learning outcome for 22 students in cycle 1 of 67.92%. Because these results did not meet the achievement of the predetermined percentage of learning outcomes, namely 80%, the research was continued in cycle 2.

The results of the implementation of cycle 2 showed complete learning outcomes for 26 students or 84.3%. The results obtained in cycle II showed an increase in learning outcomes that exceeded the achievement of the percentage, namely 80%. These results have proven that the application of the Direct Instruction model using the Cisco IT Essential Virtual Desktop can improve student learning outcomes, especially class X students majoring in computer and vocational technology at SMK Negeri 5 Gorontalo on the subject of Computer Assembly.

AUTHORS' CONTRIBUTIONS

Nikmasari Pakaya: Contributed to research coordination, data collection and analysis, research reports, journal articles, and correspondence

Tajuddin Abidllah, Rampi Yusuf, Rahman Takdir: Contributed in data analysis and preparation the Cisco IT Essential Virtual Desktop application for the Computer Assembly subject at the planning and action stages of cycles 1 and 2

Rahmad Paudi: contribute to data collection, preparation of learning plans based on the Direct Instruction model at the planning, action, and evaluation stages in cycles 1 and 2

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REFERENCES

[1] L. Arfani, Mengurai Hakikat Pendidikan, Belajar, dan Pembelajaran, Jurnal PPKn dan Hukum; Pelita Bangsa Pelestari Pancasila, 11(2), 2018, pp. 81-97.

[2] S.B. Raharjo, Kontribusi delapan standar nasional pendidikan terhadap pencapaian prestasi belajar, Jurnal Pendidikan dan Kebudayaan, 20(4), 2014, pp. 470-482

[3] E.Megama, Pengaruh Model Pembelajaran Direct Instruction Terhadap Hasil Belajar TIK Siswa Kelas VIII SMPN 1 Tondano, Ismart Edu: Jurnal Pendidikan Teknologi Informasi, 1(01), 2020, pp. 55-59.

[4] E. Susanti, Penerapan Model Pembelajaran Langsung Untuk Meningkatkan Hasil Belajar Siswa Kelas X Multimedia Pada Mata Pelajaran Komputer Jaringan Dasar SMK-E Adikarya Linggo Sari Baganti, STKIP PGRI Sumatera Barat, 2021.

[5] U. D. Susiaty, Penerapan Model Pembelajaran Direct Iinstruction (DI) terhadap Prestasi Belajar Mahasiswa Prodi Pendidikan TIK IKIP PGRI Pontianak, Edu Sains: Jurnal Pendidikan Sains dan Matematika, 5(2), 2017, pp. 33-38. DOI: https://doi.org/10.23971/eds.v5i2.735.

[6] Aunurrahman, Belajar dan Pembelajaran, CV. Alfabeta, 2016.

[7] S. Islami and S. Yondri, Perbedaan Hasil Belajar Siswa dalam Pembelajaran Kooperatif Tipe Jigsaw dengan Konvensional, National Conference of Applied Engineering, Business and Information Technology (ASNI-Tech). 2016. pp. 414-421.

[8] M. H. Lin, H.C. Chen and K.S. Liu. A study of the effects of digital learning on learning motivation and learning outcome. Eurasia Journal of Mathematics, Science and Technology Education, 13(7), 2017. pp 3553-3564. DOI:https://doi.org/10.12973/eurasia.2017.00744a

[9] M. A. Mahbub, Pengaruh Media Pembelajaran Berbasis Cisco IT Essensials Virtual Desktop dan Motivasi Belajar dalam Meningkatkan Hasil Belajar Mata Pelajaran Perakitan Komputer di SMK Al Furqon Mranggen Demak, Journal: Journal of Informatics Education, 1(2), 2018, pp 126-135.

[10] I, Machali, Bagaimana Melakukan Penelitian Tindakan Kelas Bagi Guru, IJAR: Indonesian Journal of Action Research, 1(2). 2022.

[11] S. A. Kemmis, The Action Research Planner, Springer, 2014.

[12] P. Lestari and A. Hudaya, Penerapan Model Quantum Teaching Sebagai Upaya Meningkatkan Hasil Belajar Siswa Pada Mata Pelajaran Ips Kelas VIII SMP PGRI 3 Jakarta, Research and Development Journal Of Education, 5(1), 2018. Pp. 45-60.

[13] M. Winarno, Metodologi Penelitian Dalam Pendidikan Jasmani, UM Press, 2013

[14] R. Abubakar, Pengantar Metodologi Penelitian, SUKA-Press UIN Sunan Kalijaga, 2021

[15] M. Ie, E. Visantia, Pengaruh Efikasi Diri dan Motivasi terhadap Keberhasilan Usaha pada Pemilik Toko Pakaian di Pusat Grosir Metro Tanah Abang, Jurnal Manajemen Maranatha, 13(1), 2013, DOI: https://doi.org/10.28932/jmm.v13i1.139.