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The Influence of the Double Loop Problem Solving Learning Model on Student Outcomes in terms of Cognitive Aspects in Business and Energy Materials

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ABSTRACT

The study aims to determine whether there is an effect of the double loop problem solving learning model on student learning outcomes in terms of cognitive aspects. The research method used was Pre-Experimental Design with a one-group pretest-posttest design research design, while the technique of taking research subjects was purposive sampling. The research subjects used were 33 people from class X MIA 3. Based on the results of hypothesis testing with a sample size of 61 people, it was obtained tcount = 2.87 with t table = 1.70 so it can be concluded that tcount = 2.87 ≥ ttable = 1.70 . So Ho is rejected, which means that there is an effect of the double loop problem solving learning model on student learning outcomes in terms of cognitive aspects.

Keywords: Double Loop Problem Solving, Learning Outcomes, Cognitive

INTRODUCTION

Education is a word that is very familiar in everyday life. Education is defined as a conscious and systematic effort that aims to achieve a better standard of living. Education is closely related to any social change, both in the form of the dynamics of individual development and social processes on a broader scale. Education is defined as the development of an intellectual paradigm. In this paradigm, students are expected to have mental readiness and theoretical abilities in living their life which is always changing in modern complexity. Education is an important vehicle and an effective medium for teaching norms, socializing values, and instilling a work ethic among the community. Education can also be part of an instrument to build and nurture national personality, strengthen national identity, and strengthen national identity. Education can be a strategic vehicle for building collective awareness as citizens by strengthening social ties, while respecting diversity in culture, race, ethnicity, religion, so as to strengthen national integrity.[1].

The real function of education is to provide facilities that enable educational tasks to run smoothly, both structurally and institutionally. Structurally, it requires the creation of an organizational structure that regulates the course of the educational process. Institutionally it implies that the educational process that occurs in the organizational structure is institutionalized to further ensure that the educational process runs consistently and continuously following human needs and development which tends towards an optimal level of ability.[2].

Educational theory is the foundation and starting point in developing educational practice, for example curriculum development, school management and the teaching and learning process. Curriculum and learning are related to educational theory or in the preparation of a curriculum and this learning plan refers to educational theory. The various theories currently being developed have colored the educational process and practice. The

contributions of the figures in creating theory have provided development and progress in the educational process. The birth of theory in the field of education gives new colors to the education system, teaching and learning processes, school management and learning methods. The existence of a shift in the methods and patterns of teaching students to students is a process of implementing theory in the field of education.[3].

A teacher to be able to carry out his teaching duties properly must know good teaching and learning strategies and methods as well. A good learning strategy must have clear stages, so that the learning objectives are right on target. The achievement of a teacher's learning objectives requires a learning model. The learning model used by the teacher must be able to foster students' abilities for various learning objectives. Therefore, teachers must know and understand about learning models so that the learning process in class is more enjoyable and fosters students' abilities. The learning model is a pattern that is used as a guide to planning classroom learning and tutorials[4].

Determinant factors in improving student learning outcomes in schools such as feedback, learning models, self-motivation, learning styles, interactions, and instructor facilitation as determinants of the potential for successful learning. One of the determinants of satisfactory student learning outcomes is the learning model that is applied and has been tested in the learning process. The factor of implementing the learning model in the classroom is thought to have a strong influence on learning outcomes[5].

The learning model is a means that is chosen by the teacher to deliver lessons, by providing certain experiences, so that students can capture an impression that makes it easier for this lesson to be given. The learning model chosen by a teacher in an effort to make the teacher effective can be determined based on certain conditions with regard to the classroom situation with available facilities, time allocation and the content of the lessons to be presented. The Indonesian language learning model consists of: reading learning model, listening learning model, speaking learning model, and writing learning model[6].

There are several reasons for the importance of developing learning models, namely: a) effective learning models are very helpful in the learning process so that learning objectives are easier to achieve, b) learning models can provide useful information for students in the learning process, c) variations in learning models can giving students passion for learning, avoiding boredom, and will have implications for the interest and motivation of students in following the learning process, d) developing a variety of learning models is very urgent because of differences in characteristics, personalities, learning habits of students, e) the ability of lecturers / teachers in using learning models also varies, and they are not fixated on only certain models,and f) demands for professional lecturers / teachers to have motivation and spirit of renewal in carrying out their duties / profession[7].

This model involves students' creativity and critical thinking, emphasizes problem solving in two different but interrelated solving loops and prioritizes finding the main causes of a problem which will be the basis for determining the most important solution in solving a problem. [8]. DLPS itself is a development of the Problem Solving model where the DLPS model focuses more on finding a cause of a problem. DLPS learning can make students become active individuals in the class so that they are not only observers. In addition, the learning carried out in DLPS requires students to manage their thinking in finding a cause for a problem at hand. DLPS learning is proven to have a good impact on learning outcomes and on mathematical problem solving abilities[9].

The recommended approach in the DLPS (Doble Loop Problem Solving) model is to accommodate the differences in the causes of a problem, including the mechanism for how the

problem occurs. In the learning process using this model, students need to work on two different but interrelated problem solving loops. The loop for troubleshooting is first aimed at detecting the most immediate cause of the problem, and then designing and implementing a temporary solution. The second solution loop seeks to find the cause of the higher direction, and then designs and implements a solution from the root of the problem[10].

The advantages of the Double Loop Problem Solving (DLPS) learning method, namely: 1) Train students to design an invention; 2) Think and act creatively; 3) Solve the problems faced realistically; 4) Identifying and conducting investigations; 5) Interpret and evaluate the results of observations; 6) Stimulate the development of the progress of students' thinking to solve the problems faced appropriately; 7) Can make school education more relevant to life, especially the world of work[11]. It is hoped that the DLPS (Double Loop Problem Solving) learning model will affect the way students learn, which at first tends to be passive towards a more active[12].

In assessing learning outcomes it must be in three domains, namely the cognitive domain, the affective domain and the psychomotor domain. The cognitive domain consists of six types of behavior, namely knowledge, understanding, application, analysis, synthesis and evaluation. The affective domain consists of five behaviors, namely acceptance, participation, assessment and determination of attitudes, organization and formation of life patterns. The psychomotor domain consists of seven types of behavior, namely perception, readiness, guided movements, accustomed movements, complex movements, adjustment of movement patterns and creativity.[13]. Less fun and challenging and unattractive learning for students is one of the factors for low learning outcomes in the cognitive realm because in the learning process students do not play an active role, learning is often carried out in one direction, and is more educator-centered[14].

Cognitive theory comes from the word cognition, which means the process of knowing something. This theory is the basis for the development of other learning theories, such as information processing theory and constructivist theory. Cognitive psychology emphasizes unobservable concepts, such as reason, memory, attitudes, motivation, thoughts, reflection, and other internal processes. Cognitive processes link the relationship between stimulus and response so that students can maintain the same response in a changing environment or show different responses in the same environment, depending on what they perceive as adaptive. Cognitive development is a combination of parts of the maturation of the brain and nervous system, as well as adaptations to the environment. There are five terms used in describing cognitive development schemes, namely: (1) schema, (2) adaptation,[15].

Based on the explanation above, this study focuses on the researcher's curiosity about the effect of the double loop problem solving learning model on student learning outcomes in terms of cognitive aspects on business and energy materials.

RESEARCH METHODS

This study used a one-group pretest-posttest design. The technique used to obtain the sample of this study was purposive sampling technique, namely the sampling technique with certain considerations. [16]. Based on the results of student cognitive learning with a total sample size of 61 students divided into 1 control class and 1 experimental class, respectively 33 students in the experimental class and 28 students for the control class. The research data were obtained by using a test technique to measure students' cognitive learning outcomes. The test used is in the form of descriptions of Business and Energy in accordance with Bloom's taxonomy. The tests carried out include the validity test, reliability test, distinguishing power test, and difficulty level test.

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RESULTS AND DISCUSSION

Cognitive learning outcomes on the subject matter of Business and Energy with vector analysis through the application of the double loop problem solving learning model were analyzed through the effectiveness of learning and student learning completeness. The lowest score on the pretest data was 11, the highest score with a score of 15 and the average pretest score of 33 students was 32 while the lowest score on the posttest data was 57, the highest score with a score of 86 and the average posttest score of students was 81 In the normality test the researcher used the Liliefors test with a simple error estimate. The results obtained are:

Table 1. Normality Test Data

n	Db	α	Lhitung	Ltabel	Conclusion
33	3	0.05	0.109	0.154	Normal

So that the value of Lhitung = 0.109 and Ltabel = 0.154 with a significance level of α = 0.05 and the number of students (n) as many as 33 students. So it can be concluded that Lhitung = 0.109 <Ltabel = 0.154 means that the experimental class is normally distributed. The homogeneity test of the researchers used the Bartlet test and the following results were obtained:

Table 2. Homogeneity Test Data

n	Db	Xcount	Xtabel	Conclusion
nx = 33 ny = 33	db x = 12 db y = 12	1.41	1.76	Homogeneous

Xcount = 1.41 and the value of Xtable = 1.76 with a significance level of α = 0.05. So it can be concluded that Xcount = 1.41 <Xtabel = 1.76, then the experimental class is homogeneous. In testing the hypothesis with the t-test, the researcher used the Related sample formula. The results of hypothesis testing that have been done are:

Table 3. Hypothesis Test Data

thitung	t table	α	Conclusion
2.87	1.70	0.05	Take effect

tcount = 2.86738 with a sample size of 33 students and a significance level of α = 0.05, the value of ttable = 1.70 was obtained. Because tcount = 2.86738> ttable = 1.70, it can be concluded that there is an effect of using double loop problem solving learning models on student physics learning outcomes.

CONCLUSION

The post-test score of the experimental class learning outcomes in the experimental class was treated with the double loop problem solving learning model and the average score was 81, while the pretest score average was 32.Thus, the average value of students' cognitive learning outcomes after being given more treatment higher than before being treated. The results of the calculation of the normality test in the class given the double loop problem solving learning model treatment obtained Lhitung <Ltabel (0.109 <0.154), it means that the experimental class after being given treatment is normally distributed. After that the calculation of the results of the homogeneity test obtained X count> X table (1.41> 1.76), so the two data groups have the same or homogeneous variance. The calculation of the hypothesis using the t-test formula at the significant level α = 0,

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BIBLIOGRAPHY

[1] T. Kadi and R. Awwaliyah, "Educational Innovation: Efforts to Solve Educational Problems in Indonesia," *J. Islam Nusant.*, vol. 1, no. 2, pp. 144–155, 2017, doi: 10.33852 / jurnalin.v1i2.32.

[2] S. Saat, "DETERMINAN FACTORS IN EDUCATION (Study of Meaning and Position in Education)," *J. Ta'dib*, vol. 8, no. 2, pp. 1–17, 2015, [Online]. Available: ejournal.iainkendari.ac.id/al-tadib/article/view/407.

[3] AS Sholichah, "Educational Theories in Islam," *J. Educator. Islam*, vol. 07, no. 1, pp. 23–46, 2018, doi: 10.30868 / EI.V7.

[4] G. Istiningsih, EMLA, and E. Prihalina, "Development of a 'Promister' Learning Model to Improve Learning Outcomes of Wayang Pandhawa in Elementary School Students," *Holistika J. Ilm. PGSD*, vol. II, no. 2, pp. 94–103, 2018.

[5] A. Yanuarti and A. Sobandi, "Efforts to Improve Student Learning Outcomes Through the Application of Quantum Teaching Learning Models," *J. Educator. Manaj. Offices*, vol. 1, no. 1, p. 11, 2016, doi: 10.17509 / jpm.v1i1.3261.

[6] RT Sudrajat and W. Wuryani, "Sentence Learning Model Using a Character-Based Cooperative Approach at IKIP Siliwangi-Bandung," *Sematic*, vol. 8, no. 1, pp. 30–36, 2019, doi: 10.22460 / semantic.vXiX.XXX.

[7] A. Asyafah, "CONSIDERING THE LEARNING MODEL (Theoretical-Critical Study of Learning Models in Islamic Education)," *TARBAWY Indones. J. Islam. Educ.*, vol. 6, no. 1, pp. 19–32, 2019, doi: 10.17509 / t.v6i1.20569.

[8] Yuliana, Ismail, and Rispawati, "The Influence of the Double Loop Problem Solving Model on the Critical Thinking Ability of Class X Students in PPKn Subjects," *Juridiksiam Educator. Sauce. and Diversity*, vol. 4, no. 1, pp. 121–138, 2018, [Online]. Available: https://doi.org/10.1016/j.cell.2017.12.025%0Ahttp://www.depkes.go.id/resources/download/info-terkini/hasil-riskesdas-2018.pdf%0Ahttp: //www.who.int/about/licensing/.

[9] OI Pratama and S. Suherman, "Learning Double Loop Problem Solving Against Mathematical Problem Solving Ability," *Decimal J. Matt.*, vol. 1, no. 3, pp. 285–291, 2018, doi: 10.24042 / djm.v1i3.2661.

[10] WF Arum, "Influence Models Learning Double Loop Problem Solving and Problem Posing on Fluid Materials, "J. Tek. STTKD, vol. 4, no. 2, pp. 40–50, 2017.

[11] F. Aryansyah, "Optimizing the Use of Using the Double Loop Problem Solving (Dlps) Learning Method in Economic Learning in Senior High School," *J. Education (Economics, Educators. And Accounting)*, vol. 5, no. 2, pp. 137–142, 2018, doi: 10.25157 / je.v5i2.961.

[12] L. Ayusetyaningsih, T. Sri, and H. Wulandari, "Test the Validity of High School Biology Student Worksheets (LKS) Based on the Double Loop Problem Solving (DLPS) Learning Model on Ecosystem Materials to Improve Concept Understanding," in *Proceeding Biology Education Conference*, 2018, vol. 15, pp. 288–295.

[13] Y. Subekti and A. Ariswan, "Learning physics with experimental methods to improve cognitive learning outcomes and science process skills," *J. Inov. Educator. IPA*, vol. 2, no. 2, p. 252, 2016, doi: 10.21831 / jipi.v2i2.6278.

[14] TA Astuti, N. Nurhayati, RH Ristanto, and R. Rusdi, "Learning Based on Biological Problems in the Cognitive Aspects: A Meta-Analysis," *JPBIO (Educator Journal. Biol.*, vol. 4, no. 2, pp. 67–74, 2019, doi: 10.31932 /

jpbio.v4i2.473.

[15] G. Widyatmojo and A. Muhtadi, "Development of interactive multimedia learning in the form of games to stimulate cognitive and language aspects," *J. Inov. Technol. Educator.*, vol. 4, no. 1, p. 38, 2017, doi: 10.21831 / jitp.v4i1.10194.

[16] N. Martono, *Quantitative research methods: Content Analysis and Secondary Data Analysis (free sample page)*. RajaGrafindo Persada, 2010.