



Synergy Analysis of Advance Organizer and Project Based Learning Models with Improvements Sociology Learning Outcomes of High School Students

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Abstract:

Abstract. This study analyzed the synergy of the AO and PBL models in constructing students' cognitive, affective and psychomotor structures. The objective to find out whether there is a significant effect of the synergy AO and PBL model on high school sociology learning outcomes. According to the characteristics of quantitative research methods using True Experimental Design with Pretest-Posttest Only Control Design. In this study, there were two groups selected at random.

The experimental group was the treatment synergy group of the AO and PBL models, while the control group was the group that used the PBL model, each group consisting of 23 students. Material structure, lesson plans, pre-test and post-test learning outcomes, as well as observation are used as research data collection instruments. The data were analyzed using the N-Gain Test for the experimental group and the control group, after the Normality Test and Homogeneity Test were carried out. The last paired sample T-test was conducted. Research findings revealed 1) The average N-Gain score for the experimental group is 91.9 or 91.9% (Effective) compared to the average N-Gain score for the control group which is 67.89 or 67.8% (Effective enough). 2) The results of the Paired Sample T-Test concluded that there was a significant influence between the experimental group and the control group on the learning outcomes of sociology in high school. It is recommended that the synergy of the AO and PBL models can be implemented in education and teaching activities in high school.

Keywords: Advance Organizer Model; Project Based Learning Model; Learning outcomes

INTRODUCTION

Quality learning is created from the idea of teachers who are concerned with the implementation of the stages of the learning process well, not concerned with learning outcomes. Quality graduates are built from quality inputs and processes. Good input can create

quality learning. Assessing quality learning is centered on process assessment (William, 2011). Synergic teaching indicators during the learning process and used as the focus of evaluation, among others; psychological factors of students, teacher competence, learning models, educational facilities, learning environment atmosphere. Knight (2017) again reminded that do not force scores and grades to be performance indicators of quality education, however, it can be misleading to judge quality based on a set of learning outcomes assessment instruments in the desired direction. The fact that assessment objectives can be integrated into three main areas: feedback, motivation and student learning (Kyriazi, 2015).

If the choice prioritizes the process of learning activities compared to learning outcomes, then the teacher should have many choices of learning models that are more participatory, constructive and innovative. The learning model emphasizes the phase or stages of learning activities that can provide convenience for students to construct cognitive, affective and psychomotor processes. AO and PBL models emphasize the phase or sequence of learning (Kruse, 2009; Joyce et al., 2015; Walker, A. and Leary, H. 2009; Kowshik, M.C 2015)

The AO learning model is commonly called meaningful learning and the PBL model is commonly called a meaningful project. David Ausubel developed the AO model which discusses verbal learning in terms of three things: (1) how knowledge is managed, (2) how the mind works in processing new information, and (3) how teachers can apply these ideas to curriculum and learning. when they present new material to students (Joyce, et al, 2016). The PBL model provides opportunities for students to work together to build meaningful projects. Students can exchange ideas and solve problems together. In addition, PBL also motivates students to develop analytical and critical thinking skills, and improve higher order thinking skills (Boyles, T., & College, M., 2012). PBL requires collaboration, communication, problem solving and independent learning. PBL allows students to construct their knowledge based on the knowledge they already have which has a positive impact on competency achievement.

The AO and PBL learning models above, if collaborated in a learning atmosphere, are expected to provide opportunities for collaboration between students in constructing their cognitive, affective and psychomotor skills. Collaborative learning is emerging as a new form of future education in companies and schools that promotes the generation of group knowledge, enhances the ability to solve high-level problems, and motivates students to participate in learning (Heejeon Suh, 2011).

LITERATURE REVIEW

Advanced Organizer Learning Model

Ausubel is a pioneer of cognitive school, he put forward the theory of meaningful learning. Meaningful learning is the process of associating new information with relevant concepts contained in a person's cognitive structure. Cognitive theory focuses a lot of attention on the conception that the acquisition and retention of new knowledge is a function of the cognitive structure that students already have. The use of advance organizers as a content framework will be able to improve students' ability to learn new information, because it is a framework in the form of abstractions or summaries of the basic concepts of what is learned, and its relationship to the material that already exists in the student's cognitive structure. If well organized advance organizers will make it easier for students to learn new subject matter, as well as its relationship to the material they have learned (Ausubel, 1960).

The results of Farkhunda Rasheed Choudhary et al's research show that the variety of actions taken at the beginning of the core learning activities can create student interest in learning groups to pay attention to learning (Farkhunda Rasheed Choudhary et al, 2015). Advance Organizers can be a useful tool at the beginning of the lesson, before the discussion, before the question and answer period, before giving homework assignments, before student

reports, before watching videos, before students read from their science books, and before discussing science concepts based on students' laboratory experiences.

The steps of the AO model according to Kowshik (2015) consist of three interrelated phases, namely: (1) Clarifying the teaching objectives. In this case it is intended to build the attention of students and guide them to learning goals where both are important to help create meaningful learning; (2) Presenting organizer. In presenting the organizer (concept framework) there are several important things that must be done, namely: (a) Identifying attributes; (b) Give examples; (c) Provides a set atmosphere for the concept; (d) Repeating the presentation of a general and comprehensive conceptual framework and then proceeding with the presentation of more specific information; (3) Encouraging and encouraging students' knowledge and experience. In this section, the active role of students is seen in the form of responding to organizational presentations given by the teacher.

The advantages of the AO model in teaching: (a) AO techniques become a student-centered approach, changing student attitudes towards classification in a positive way that contributes to improving academic performance, Wekesa, Noah Wafula, Ongunya Raphael Odhiambo (2016); (b) It can encourage students to be more active in knowing the answers to the questions given and students can interact by solving problems to find the concepts developed (Farkhunda Rasheed Choudhary et al, 2015); (c) Students are effective in practice, lots of student involvement in learning activities and a lot of time is spent studying relevant passages, Abolghasem Yaa qubi, Hosein Mohaqeqi, Nasrin Taheri Khoshbin (2015). The disadvantages of the AO Organizer model in the teaching process include: (a) Intensive control is needed from the teacher, so that if there are too many students, the learning process is less effective; (b) There must be active collaboration between teachers and students, (M. C. Kowshik (2015).

Project Based Learning Model

The co-constructivistic learning theory found by Lev Vygotsky (1896-1934) is also referred to as the social construction theory which emphasizes that human intelligence comes from society, its environment and culture. Coconstructivistic learning theory is the basis of the PBL model that places students at the center of learning. PBL has been adopted by many countries and is increasingly being piloted in various educational institutions around the world (Pereira, et al. , 2017). PBL model has the main goal is to create learning effectiveness where students can work collaboratively in groups to direct in answering a question, solving a problem, or overcoming a challenge with the aim of creating a final product.

The step of PBL development involves six main components named The Six A's of Designing Projects, namely: (1) Authenticity (authentication), projects designed with authentic characteristics that are connected with real-world problems that are of concern to students, (2) Academic Rigor (adherence to academic values), involving elements of academic rigor, students face challenges that really involve their minds; (3) Applied Learning (learning in the real world), raising issues that are relevant to the real world; (4) Active Exploration (actively researching), involving students more in work; (5) Adult Relationship (relationship with experts), involvement with adults outside the classroom; (6) Assessment, feedback on the assessment of the implemented projects, (Walker, A. and Leary, H. 2009; Kowshik, M.C. 2015)

The PBL model provides several advantages, including: (a) Learning through PBL tends to increase motivation (Fernandes et al., 2014); (b) Giving students a sense of satisfaction, it helps to develop learning skills (Edström & Kolmos, 2014); (c) To develop a deep and integrated understanding of content and processes, enable students to learn to work together to solve problems, and promote learning responsibility and independence (Chau, 2005; Chua et al., 2014; Frank et al., 2003).); (d) PBL also contributes to bringing classrooms close to the profession through the acquisition of knowledge while solving practical and real-world

professional cases. The PBL model has several weaknesses, including: (a) it takes a lot of time to solve problems; (b) Lots of equipment and costs to be provided; (c) When the topic given is different for each group, it is feared that students will not be able to understand the topic as a whole.

METHODOLOGY

The study used *true-experimental design*, one of the most extensive experimental designs in educational research (Donald T. Campbell & Julian C. 1963) in which learners were assigned to experimental groups and control groups. The experimental group was taught using synergistic models of AO and PBL, while the control group was taught the PBL model. Both the experimental group and the control group were instructed by teachers to follow the planned learning steps. Treatment is done within four weeks.

The population of this study is 92 Students of Class XI Of State High School 14 Ambon, Indonesia. The sample in the study was 46 students (50% of the population). Sampling using *random sampling* techniques.

The Learning Achievement Test is used to obtain information about students' academic abilities (Kothari, 1990). To compare pre-test results and post-test learning achievement tests, experimental and control groups were used. Pre-test exams are used to determine the academic ability of learners before being treated to synergistic models of AO and PBL. Post-tests on the other hand are used to determine improvements in learning outcomes. The Attitude Test questionnaire was used to gather information about learning attitudes towards the concepts of socialization and personality formation when taught using the synergistic models of AO and PBL for experimental classes compared to their attitudes when taught using the Project Based Learning model.

Post-test research pre-test information obtained from the Learning Achievement Test is tabulated and the data is analyzed descriptively and inferentially using statistics, a statistical package program for the social sciences (SPSS). Descriptive statistics concern the development of a particular index of raw data while inferential statistics relate to the process of generalization (Kothari, 1990). Post-test (CAT) pre-test data is analyzed first with descriptive statistics to obtain the N-Gain mean and standard deviation and then ANOVA inferential statistics are used to determine significance in the differences between experimental and control groups with t-tests.

RESULTS

This study examines the synergy of the AO and PBL models in sociology learning in high school. After completing data collection, statistical tests were then carried out.

1. Normality Test

Table 1. Initial Normality Test for Experiment Class and Control Class

Group	Number of Samples (N)	Sig	Conclusion
Experiment	23	0.010	Normal
Control	23	0.025	Normal

The significance value of the experimental class 0.010 is smaller than 0.05, meaning that the learning outcomes are normally distributed. While the significance value of the control class 0.025 is smaller than 0.05, meaning that the value of learning outcomes is normally distributed.

2. Homogeneity Test

Table 2. Test of Homogeneity of Experimental Class and Control Class

Group	Number of Samples (N)	Sig	Conclusion
Experiment	23	0.385	Homogeneous
Control	23	0.442	Homogeneous

The significance value of the experimental group is 0.385 and the significance value of the control group is 0.442 which is greater than 0.05, so it can be concluded that the variance of the two populations is homogeneous.

3. N-Gain descriptive test

At the beginning of the lesson, a pre-test was conducted to measure the students' initial abilities and at the end of the lesson a post-test was conducted. Improved learning outcomes test can be interpreted by using Normalized Gain (N-Gain). First, the Gain Score is determined as follows:

Table 3. N-Gain test for experimental class and control class

Description	Experimental Group	Control Group
Sample	23	23
low Score	82,05	58,97
High Score	97,50	73,17
Mean N-Gain	91,97	67,89
Category	High Category Effective	High Category Effective Enough

Description***) Gain score sharing

Category N-Gain Value

g > 0.7 Height

0.3 g 0.7 Medium

g 0.3 Low

Category of N-Gain Effectiveness

< 40 Ineffective

40- 55 Less Effective

56 – 75 Quite Effective

>76 Effective

Source: Hake, R.R (1999)

Mean N-Gain The experimental group is in the high category, as well as the mean N-Gain of the control group is in the high category.

The results of the N-Gain test can be seen in the experimental group that there is a higher increase than the control group with the N-Gain value obtained 91.97. The results of the analysis of post-test data items for each class, namely the experimental class and control class, Based on the results of the N-Gain score test, it shows that the average N-Gain score for the experimental class is 91.9 or 91.9 % is included In the Effective category. The average N-Gain score for the control group is 67.89 or 67.8%, which is included in the Quite Effective category.

4. Paired Sample T-Test

Table 4. Paired Sample T-Test

Group	Df	Std. Error Mean	t _{hitung}	Sig. (2-tailed)
Experiment Vs Control	22	1.066	17.865	0.000

Based on the data in the table above, tcount (17,685) > ttable (2,074). This means that H0 is rejected and H1 is accepted.

DISCUSSION

After knowing the results of this research data analysis, the next step is to see the level of achievement of the objectives of this study. The purpose of this study was to determine whether there was a significant effect of the synergy between the AO and PBL models on high school sociology learning outcomes. The results of the study are illustrated in the following diagram.

A good pre-test result is in accordance with the experimental assumptions if the pre-test value of the experimental group is not significantly different from the results of the control group's pre-test. The results showed that the pre-test difference between the experimental group and the control group was 0.17. Thus, $0.17 < 0.5$ is not significantly different.

The control group in this study is the group that applies the PBL model based on the sequence of learning activities, namely: (1) Authenticity; (2) Academic rigor; (3) Applied learning; (4) Active exploration; (5) Adult relationships; (6) assessment practices. (B. T. Wang, C. W. Teng, and Y. H. Lin, 2015).

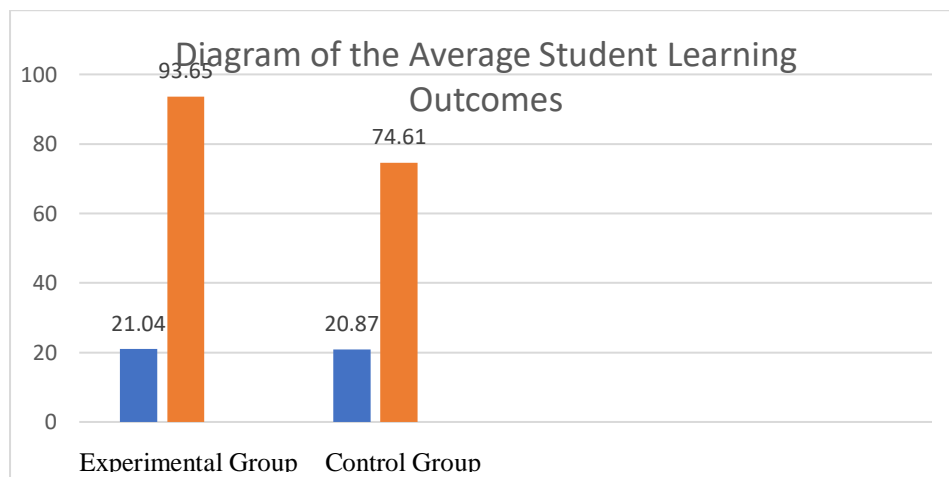


Figure 1. Diagram Of The Average Value Of Learning Outcomes

The results of data analysis show that the Mean N-Gain value is 67.89, meaning that the value of high school students' sociology learning outcomes is classified as "high". Likewise, the lowest score of 58.97 and the highest score of 73.17 were in the 56-75 category "quite effective", meaning that learning activities using PBL were quite effective in improving sociology learning outcomes in high school. The results of this study illustrate how important it is to follow the project steps in improving student performance to get good learning outcomes. (Wafula, Odhiambo, 2016)

The experimental group is a group of students who are given treatment regarding the synergy of the AO and PBL learning models. The synergy of the two learning models, a new sequence of learning activities is arranged as follows: (1) Clarifying learning objectives; (2) Authenticity; (3) Academic Rigor; (4) Presenting an organizer and applied learning; (5) Adult Relationships; (6) Assessment.

The results of the data analysis of this study indicate that the Mean N-Gain value is 91.97, meaning that the value of high school students' sociology learning outcomes is classified as "high". Similarly, the lowest score of 82.05 and the highest score of 97.50 were in the category 76 "effective", meaning that learning activities using PBL were effective in improving sociology learning outcomes in high school. The increase in the average learning outcomes when starting from the average value of the control group to the average value of the experimental group (the N-Gain of the experimental group minus the N-Gain of the control class), increased by 24.08%.

The next step is the Paired Sample T-Test to test the effect of the synergy between AO and PBL to improve learning outcomes. Obtained $t_{count} (17.685) > t_{table} (2.074)$. This means that H_0 is rejected and H_1 is accepted. Thus, it can be concluded that there is a significant

effect between the synergy of the AO and PBL models on high school sociology learning outcomes.

The operational sequence of the synergistic AO and PBL models which are the focus of treatment in the experimental group based on the subject: Socialization and Personality Formation in class XI in high school, can be seen in Table 5 below.

Table 5. Operational Sequence of Sociology Learning Activities in Class XI SMA

Learning Stage	Learning Activities	Student Actions
I. Early Stage of Learning		
1. Clarifying goals	1. The teacher opens the lesson, 2. Playing video clips socialization and formation personality 3. explain the learning objectives	1. Train seriousness 2. Generating motivation 3. Confidence that the goal can be achieved
2. Autenticity	1. explain the problem relationship real faced with discipline other knowledge 2. Ensure real problems are meaningful for student 3. Explaining work instructions 4. Ensure the same project can work outside of school	1. Gathering information 2. Students build awareness about project significance 3. Listening 4. Building students' optimism that projects can be done outside of school
3. Academic Rigor	1. The teacher directs students to acquire basic knowledge more than one disciplines 2. Make sure the project is challenging students to use strategies scientific discovery 3. Develop skills and higher order thinking habits	1. Information and knowledge exploration project related 2. Develop curiosity 3. Develop creativity 4. Developing abilities formulate questions for form the necessary critical thinking to live smart.
II. Learning Core		
1. Presentation of Learning Tasks or Materials	1. Group formation 2. Project selection 3. Information gathering 4. Technical instructions for project work steps	1. Build cooperation 2. Identify the project 3. Reasoning technical instructions
2. Active Exploration	1. Each group is actively discussing 2. Complete the Worksheet 3. Use significant time to work on the main field 4. Using various strategies media and various sources other 5. Presentation 6. Compile reports	1. Observing carefully 2. Asking 3. Practice 4. Reasoning 5. Develop creativity 6. Critical thinking 7. Communicating findings
Adult Relationship	1. Project consultation to experts that exist in society	1. Actively exchange ideas 2. Fix reports
III. Learning Evaluation		
	Post-test	1. Self-confidence

The AO and PBL learning models use constructivist theory derived from the philosophy of knowledge which emphasizes that knowledge is a student's own construction. Knowledge is the result of construction of individuals after going through a project. The AO and PBL learning models avoid the transfer of knowledge from the teacher, but students are invited to be fully involved in the knowledge seeking process through the steps of the AO and PBL learning models.

CONCLUSION

The synergy of the AO and PBL models is focused on combining the phases of AO learning activities and The Six A's of Designing Project PBL. It is proven to be able to make it easier for students to learn and improve learning performance as well as facilitate the formation of students' cognitive, affective and psychomotor structures that can lead to better academic performance. Research findings through the N-Gain test show that the control class that applies PBL shows an increase in learning outcomes of 67.89 "high" and is classified as "quite

effective", compared to the experimental group that applies the synergy of AO and PBL models showing an increase in learning outcomes of 91.97 "high" and classified as "effective". This study provides empirical evidence that there is a significant effect between the synergy of the AO and PBL models on the learning outcomes of sociology in high school. For further study, the synergy between the AO and PBL models is recommended to be implemented in sociology subjects in high school.

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