

STUDENTS ACTIVE ROLE IN LEARNING THE BASICS OF ANALYTICAL CHEMISTRY IN OCCUPATIONAL HEALTH, SAFETY AND ENVIRONMENT SUBJECT BY USING THE DISCOVER LEARNING MODEL

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ABSTRACT

The study uses the classroom action research method carried out in two cycles. The research aims to improve the learning outcomes of Occupational Safety and Environmental Health subject for SMK Negeri 1 Temanggung students grade 10 of academic year 2023/2024. Whereas at the time of the pre-research, 21 students were declared failed and 15 students were declared passed at the minimum passing grade of 75. Research result shows that there are significant improvements on the learning outcome after applying the Discovery Learning Model. Analysis on the passing grade result before the research begins is 90% or 1 student declared passed. Result of the first cycle, the passing grade is 72% or 26 students declared passed, and on the second cycle the passing grade is 86% or 31 students declared passed. The conclusion of this study is that the use of the Discovery Learning Model can improve the learning outcomes of Occupational Safety and Environmental Health subject in Grade 10 students of Analytical Chemistry 3 of SMK Negeri 1 Temanggung for the 2023/2024 Academic Year.

Keywords: Learning outcome analysis, passing grade, Learning Model.

INTRODUCTION

Education is one of the prominent factors in building high quality and competitive human resources. In education, student's passing grade is considered as the main indicator of a successful learning process. Adaptive journal subject, as integral part of learning The Basics of Analytical Chemistry has a crucial role in students understanding towards the process of taking note and reporting of an entity's journal state.

To overcome learning challenges in globalization and information technology era, the use of learning model has become a must. Teaching aid can enhance the quality of learning by giving variation and motivation to students in becoming more creative and innovative in the learning process. Nevertheless, there are obstacles in adjustment journal learning material, especially in the unoptimized delivery of the learning material. The recurring challenges are students' low understanding, students' boredom, and the lack of variation in the teachers' delivery of learning material.

Innovation is, therefore, needed in order to process learning adjustment journal material. Applying Discovery Learning Model is considered both effective and efficient in upgrading the students' learning outcome. The Discovery Learning Model is proven to provide vivid visualization, structured information tier, that can improve students' involvement in the learning process. By integrating Discovery Learning Model in adjustment journal learning material, it is expected that the learning atmosphere will become more interesting, the students will understand more complex concepts easily, and students' motivation will develop. Therefore, contributing positive improvements toward students' learning achievements in The Basics of Analytical Chemistry in Occupational Health, Safety and Environment subject.

The five significant components in teaching and learning process are goal, material, method, media, and learning evaluation. These five aspects influence each other in the way that the selection of one particular teaching model will have an impact on the appropriate type of learning media, involving the three other important aspects. It is believed that one of the main functions of learning media is as a teaching aid that also influences the motivation, conditions, and learning environment (Hamalik, Oemar. 1990). The use of teaching aid in learning process can evoke interest and learning will, also motivation and stimulation of learning activities, and bring psychological influences towards learning itself. The use of teaching aid in orientation phase of the teaching process will help gain learning effectivity and convey the message of the learning material (Wiratmojo, P. and Sasonohardjo, 2002). (Los, n.d.). To limit the scope of research, the authors limit the problems as: the effort to improve learning outcomes in the analysis of adjustment transaction documents and the effort to improve learning outcomes in The Basics of Analytical Chemistry in Occupational Health, Safety and Environment subject for Grade 10 students in SMK Negeri 1 Temanggung. The formulation of the problem in this study is whether the use of Discovery Learning Models can improve learning outcomes in Occupational Health, Safety and Environment subject for Grade 10 students in SMK Negeri 1 Temanggung for the 2023/2024 Academic Year. The research objectives include the general objective to

improve the teachers' skills in presenting Occupational Health, Safety and Environment subject by using Discovery Learning Model. While the specific objective is to determine the motivation of learning outcomes in Occupational Health, Safety and Environment subject using Discovery Learning Model for Grade 10 Analytical Chemistry 3 students at SMK Negeri 1 Temanggung of the 2023/2024 Academic Year.

METHOD

The research is conducted using Classroom Action Research method, which is conducted by teachers in their own class through self-reflection, with the aim of improving their performance as teachers so that students' learning outcomes can be increased (Wardhani, 2007: 1.4). The design used in this Classroom Action Research is the one encouraged by Arikunto. According to Arikunto (2009: 20), there are four important stages in action research, namely planning, implementation, observation, and reflection. The four stages in the action research will form a cycle, where one cycle starts from the planning stage and ends at the reflection stage. The number of cycles not only depends on whether or not the action is still needed, but also depends on the learning problems needed to be solved. Classroom Action Research (CAR) is an observation of activities that are deliberately carried out in the same class, carried out by the teacher in collaboration and aims to improve the situation for a better direction. This research is expected to solve the problems faced by teachers so that the learning process can run smoothly and learning objectives can be achieved effectively and efficiently. Through the Classroom Action Research Approach the problems faced by the teacher and students can find a solution. Overall, the four stages in this CAR form a CAR cycle depicted in the form of spiral. More than one cycle is needed to overcome the problem, with the cycles being connected and sustainable. The design used in this study can be described as below: (1) Planning. In this stage, the researcher explains what, when, where, by whom and how the action was carried out. In the design compiling phase, the researcher determines the point or focus of events needing special attention to observe, then make an observation instrument to help researchers record events occurring during the study. (2) Implementation of Actions. In the stage of implementing the action, researchers apply the contents of the draft that has been prepared in the planning stage. In this case, researchers must remember and always follow through the preparation at the planning stage. (3) Observation. During this stage, data recording is carried out, including the process and result of the implementation of activities. The purpose of observing is to gather evidence of the result of action so that it can be evaluated and used as a foundation in reflection. (4) Reflection. It is the stage where researchers rearrange what has been done. Together with

the observers, researchers finish taking action. In the reflection stage, an analysis of data is made about the processes, problems, and obstacles encountered. Then proceed with a reflection on the impact of implementing the actions carried out.

The research subject constitutes of 36 students of Grade 10 Analytical Chemistry 3 students of SMK Negeri 1 Temanggung. The research object is the under passing students on Occupational Health, Safety and Environment subject. Time of research is done in: First cycle: Thursday, January 18, 2014, and Second cycle: Thursday, January 25, 2024. Location for the CAR is done in SMK Negeri 1 Temanggung, Parakan District, Temanggung Regency, Central Java Province for students of Analytical Chemistry 3. Data collection technique is done by conducting practical tests (performance) given to students at the end of the learning process. Data collection instruments are carried out using test instruments and documentation.

FINDINGS AND DISCUSSION

The study aims to determine the improvement of student learning outcomes in Occupational Health, Safety and Environment subject through the Discovery Learning Model for Grade 10 Analytical Chemistry 3 of SMK Negeri 1 Temanggung, Parakan District, Temanggung Regency, Central Java Province. The research data obtained are student learning outcomes data. Student learning outcomes data are presented in the following two cycles:

1. Cycle I

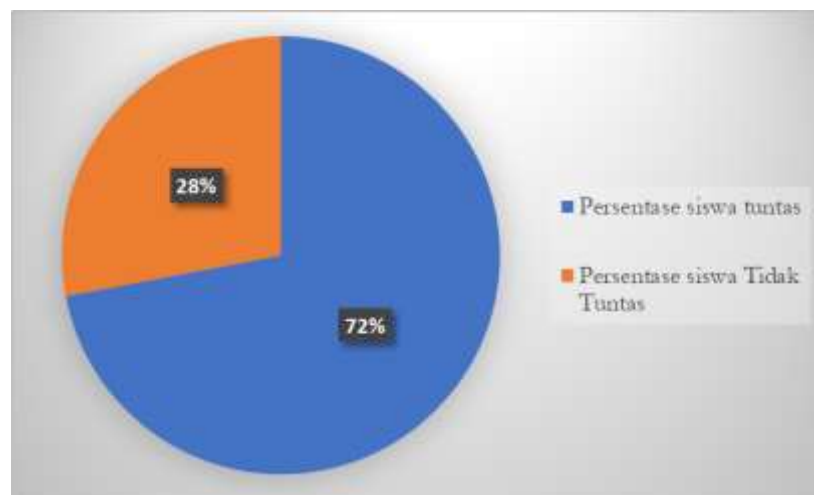
Using Discovery Learning Model on Occupational Health, Safety and Environment subject on first cycle. The first cycle is conducted on Thursday, January 18, 2024 in three meetings (3 x 45 minutes). Result of teachers/researchers' observation shows that learning result on Occupational Health, Safety and Environment subject for Grade 10 students of Chemistry Analysis 3 is as follows:

Table 1: Final Assessment Sheet (Individual) I

No.	NAME	CLASS	GRADE	CRITERIA
1	Ahmad Sauqi Naufal	X KA 3	80	Passed
2	Aleena sheila tri riani koesumo	X KA 3	60	Failed
3	Alkayla Yunaesia	X KA 3	80	Passed
4	Ananda Meilita Putri Nur Cahyanti	X KA 3	80	Passed

5	Aqila Mahya Rosidi	X KA 3	100	Passed
6	Bima Batara Wijaya	X KA 3	100	Passed
7	Dania Fatma	X KA 3	80	Passed
8	Daniswara	X KA 3	80	Passed
9	Elisa Dwi Fatma Melika	X KA 3	100	Passed
10	Fify Miladiyana Yahya	X KA 3	80	Passed
11	Fredy Willyanda Saputra	X KA 3	60	Failed
12	Ghina Farah Shafitri	X KA 3	100	Passed
13	Ilham Ari Darmawan	X KA 3	60	Failed
14	Iput Aprilina	X KA 3	60	Failed
15	Keysha Febrianti Kirana	X KA 3	100	Passed
16	Kezia Paramita Wardhani	X KA 3	80	Passed
17	Lukluk Unnisak	X KA 3	40	Failed
18	Meitha Aulia	X KA 3	100	Passed
19	Melanie Azzahra Candra Dewi	X KA 3	40	Failed
20	Muhammad Maulana Rohman	X KA 3	60	Failed
21	Muhammad rajifun nafi	X KA 3	80	Passed
22	Nabilla Hafizhah Azzahni	X KA 3	60	Failed
23	Nadia Ikmalia Mawada Rahmawati	X KA 3	60	Failed
24	Naufal Ziqmarullah	X KA 3	60	Failed
25	Nur Latif	X KA 3	100	Passed
26	Raysha Sukma Andini	X KA 3	80	Passed
27	Reffa Reffiana	X KA 3	80	Passed
28	Revanda Tegar Arvianto	X KA 3	80	Passed
29	Sashie Kirana Pambudi Putri	X KA 3	100	Passed
30	Sekar Elsy Faradila	X KA 3	100	Passed

31	Selfy Aisyah	X KA 3	80	Passed
32	Septianan Nabila Ramadani	X KA 3	80	Passed
33	Umaira Nena Fadkhulli Jannah	X KA 3	100	Passed
34	Umarbillah Satriatama	X KA 3	100	Passed
35	Yukristi Siska Rani	X KA 3	80	Passed
36	Zazkia Laura Azzahra	X KA 3	100	Passed



Graphic 1: Percentage of Students' Passing Grade

Learning outcome of Occupational Health, Safety and Environment subject for Grade 10 students of Analytical Chemistry after receiving treatment on the first cycle is getting improvement on the passing grade of 72%.

2. Cycle II

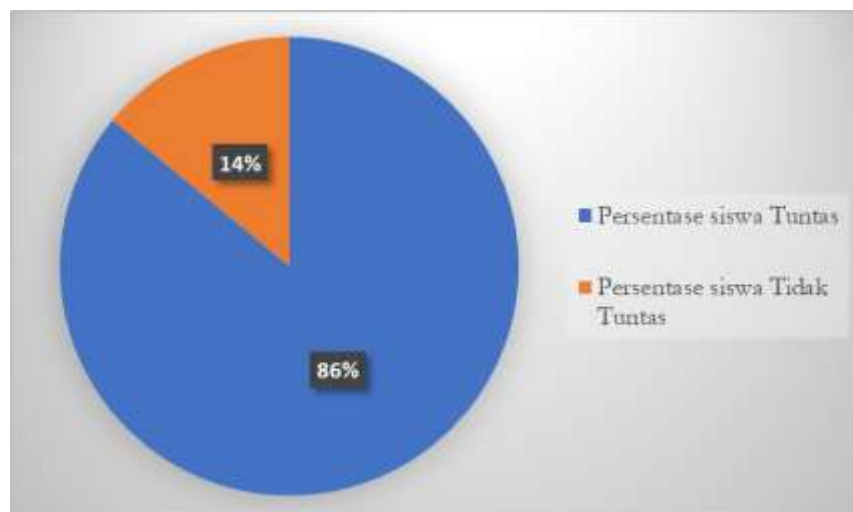
Cycle II is carried out on Thursday, January 25, 2024. On this cycle the teachers/researchers give some motivations to the students to go through the learning process well. The teachers/researchers display the Discovery Learning Model, first on the analysis of transactional documents, and then moving on to Discovery Learning Model on Occupational Health, Safety and Environment subject. At the end of the cycle, teachers/researchers conduct an observation on students' learning outcome to identify students' ability to receive the knowledge. From the observation improvement of the learning outcome has been identified. Attached is the learning outcomes of the Occupational Health, Safety and Environment subject using Discovery

Learning Model on Grade 10 students of Analytical Chemistry 3 of SMK Negeri 1 Temanggung on Cycle II. Based on the observation of Cycle II:

Table 2: Final Assessment Sheet (Individual) II

No.	NAME	CLASS	GRADE	CRITERIA
1	Ahmad Sauqi Naufal	X KA 3	90	Passed
2	Aleena sheila tri riani koesumo	X KA 3	80	Passed
3	Alkayla Yunaesia	X KA 3	90	Passed
4	Ananda Meilita Putri Nur Cahyanti	X KA 3	90	Passed
5	Aqila Mahya Rosidi	X KA 3	100	Passed
6	Bima Batara Wijaya	X KA 3	100	Passed
7	Dania Fatma	X KA 3	90	Passed
8	Daniswara	X KA 3	90	Passed
9	Elisa Dwi Fatma Melika	X KA 3	100	Passed
10	Fify Miladiyana Yahya	X KA 3	90	Passed
11	Fredy Willyanda Saputra	X KA 3	80	Passed
12	Ghina Farah Shafitri	X KA 3	100	Passed
13	Ilham Ari Darmawan	X KA 3	70	Failed
14	Iput Aprilina	X KA 3	80	Passed
100	Keysha Febrianti Kirana	X KA 3	100	Passed
16	Kezia Paramita Wardhani	X KA 3	90	Passed
17	Lukluk Unnisak	X KA 3	70	Failed
18	Meitha Aulia	X KA 3	100	Passed
19	Melanie Azzahra Candra Dewi	X KA 3	70	Failed
20	Muhammad Maulana Rohman	X KA 3	70	Failed
21	Muhammad rajifun nafi	X KA 3	90	Passed

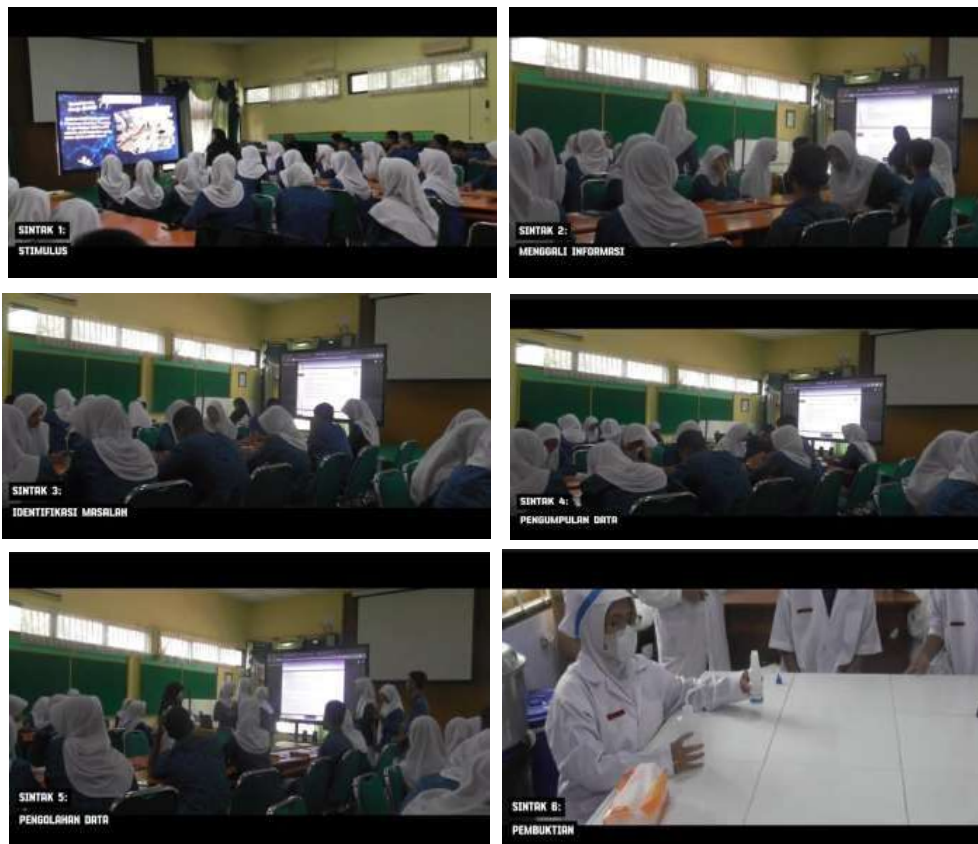
22	Nabilla Hafizhah Azzahni	X KA 3	80	Passed
23	Nadia Ikmalia Mawada Rahmawati	X KA 3	80	Passed
24	Naufal Ziqmarullah	X KA 3	70	Failed
25	Nur Latif	X KA 3	100	Passed
26	Raysha Sukma Andini	X KA 3	100	Passed
27	Reffa Reffiana	X KA 3	90	Passed
28	Revanda Tegar Arvianto	X KA 3	90	Passed
29	Sashie Kirana Pambudi Putri	X KA 3	100	Passed
30	Sekar Elsy Faradila	X KA 3	100	Passed
31	Selfy Aisyah	X KA 3	90	Passed
32	Septianan Nabila Ramadani	X KA 3	90	Passed
33	Umaira Nena Fadkhulli Jannah	X KA 3	100	Passed
34	Umarbillah Satriatama	X KA 3	100	Passed
35	Yukristi Siska Rani	X KA 3	90	Passed
36	Zazkia Laura Azzahra	X KA 3	100	Passed



Graphic 2: Percentage of Students' Passing Grade

Based on the result of the students' activities, we can identify the following: 1. Learning outcome on Occupational Health, Safety and Environment subject of Grade 10 students of Analytical Chemistry 3 of SMK Negeri 1 Temanggung after applying the second cycle shows significant increase on the passing grade of 86% with the minimum passing grade of 75, 2. From 36 students of Grade 10 Analytical Chemistry 3, there are 31 students who passes and 5 students who failed.

On the pre research stage, the passing grade of the students are 42% with 15 students passing and 21 students failing of the total of 36 students. Those who failed are caused by not getting the minimum passing grade score of 75. After receiving treatment on the first cycle by using Discovery Learning Model on the Occupational Health, Safety and Environment subject, the passing grade increased into 72 %, with 26 students passing and 10 students failing of the total of 36 students. There is an increased of 20% on the passing grade after the first cycle is conducted. While on the second cycle, the increase is 86%, with 31 students passing and 5 students failing of the total of 36 students.



Picture 1: Discovery Learning Model

CONCLUSION

Classroom Action Research on the implementation of Discovery Learning Model to increase learning outcomes of Occupational Health, Safety and Environment subject for Grade 10 students of Analytical Chemistry 3 of SMK Negeri 1 Temanggung of the 2023/2024 Academic Year is conducted in two cycles. Every cycle constitutes of four steps, namely: (1) planning, (2) implementation, (3) observation, and (4) reflection. Based on the data analysis and the discussion stated in Chapter IV, researchers can conclude that implementing Discovery Learning Model where students observe and present the result of study using Discovery Learning Model given and later on demonstrate in practical use of First Aid Kit in Chemistry Laboratory can increase the learning outcome of Occupational Health, Safety and Environment subject on Grade 10 students of Analytical Chemistry 3 of SMK Negeri 1 Temanggung of the 2023/2024 Academic Year. The following is the cause: 1. Students' courage in demonstrating First Aid Kit in laboratories has been increased after using the teaching aid. 2. Positive interaction has been developing among students when the learning process took place. Analytical Chemistry learning activity took place when students learn in a fun environment and they feel enthusiastic when the learning process took place. 3. Result of the analysis shows that there is a significant increase on the learning outcomes from Cycle I to Cycle II. Learning outcomes on Occupational Health and Safety subject on Cycle I is 72% of passing grade or 26 students out of 36. On Cycle II there is a significant increase on the percentage of the passing grade as of 86% or 31 students out of 36.

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