

# Application of the Constructivism Method with a Conceptual Approach without Formulas in Uniform and Uniform Motion in Class X-Nursing Assistant

Dewi Lupiyati<sup>1</sup>

<sup>1</sup>SMKN 28 Jakarta

E-mail: [dewisma55@gmail.com](mailto:dewisma55@gmail.com)

## ABSTRACT

The low comprehension power of students in physics lessons in the material of Regular Straight Motion and Regularly Changing Straight Motion with the constructivist method of mastery of the material without formulas is a problem that must be addressed as soon as possible. To know the factors that cause it and the solution, it is necessary to conduct classroom action research to overcome it. The purpose of classroom action research is to use the constructivist method. The model of mastery of the material without a formula is expected to improve the quality of student learning in the GLB and GLBB material. The implementation of research follows standard procedures, namely starting from the planning stage, implementing / acting, observing/observing, and ending with reflection. Reflection is an activity to analyze research data to take a stance to be continued or deemed sufficient in this research. Data from cycle I and the following process show an increase in learning outcomes. So it is hoped that CAR will be used as a culture for professional teacher performance.

**Keywords:** Regular Motion, Uniform Movement, Constructivism Method

## INTRODUCTION

Physics, as a branch of natural science, basically aims to study and analyze the quantitative understanding of natural phenomena and processes and the nature of substances and their applications. This opinion is reinforced by the statement that physics is a science that studies the parts of nature and the interactions that exist in them.

At the SMK level, physics is considered essential to be taught as a separate subject with several considerations. First, in addition to providing knowledge to students, Physics is intended as a vehicle to develop thinking skills that are useful for solving problems in everyday life. Second, Physics subjects need to be taught for a more specific purpose, namely to provide students with the knowledge, understanding, and abilities required to enter higher education levels and develop science and technology. Physics learning is carried out by scientific inquiry to foster the ability to think, work and

act scientifically and communicate as an essential aspect of life skills. And among the objectives of Physics subjects are developing reasoning skills in inductive and deductive analytical thinking by using concepts and principles of physics to explain various natural events, solving problems both qualitatively and quantitatively, mastering concepts and principles of physics and having skills to develop knowledge, and an attitude of trust. Themselves as a provision to continue their education at a higher level and develop science and technology.

The low comprehension power of students in physics lessons in the material of Regular Straight Motion and Regularly Changing Straight Motion with constructivist methods with a model of mastery of the material without formulas is a problem that must be addressed as soon as possible. This becomes a benchmark that must be a reference in conveying physics material due to a lack of understanding of physics lessons on Straight Motion material.

Straight motion is divided into two senses: Uniform Straight Motion (GLB) and Uniformly Changing Motion (GLBB). Motion is a change in the position of an object towards a reference point, while a reference point is a starting point when measuring changes in the part of an object [1].

Motion is divided into two; namely, motion is Uniform Straight Motion (GLB) is motion in a straight line without a change in direction (not turning, not turning focus) with a constant speed at a time interval [2]. In Uniformly Variable Straight Motion, there is a speed that changes in a specific time interval called acceleration. In Uniform Straight Motion, the conditions that must be met for an object to move in a straight line are a) The direction of motion of the object remains so that the trajectory is straight; b) The object's speed always remains unchanged [3].

Another definition of Regular Straight Motion is the motion of particles with a path in the form of a straight line in a fixed direction that travels the same distance in each unit of time. Uniform Straight Motion is commonly known as One Dimensional Motion with Zero Acceleration [4]. The concept of understanding straight motion changes regularly can also be assumed as an object, wherein in this motion, the speed is constant or without acceleration, so that the distance traveled in regular straight motion is the speed times the time [5].

The level of student success in learning still depends on the role of the teacher in determining learning methods. In this case, the learning method is one of the teachers' efforts so that learning can take place effectively and efficiently [6]. One of the learning methods used is constructivism [7]. In the constructivism approach, students already have prior knowledge [8], students also already know certain meanings about the surrounding circumstances. Their existing knowledge can be developed new knowledge. Also they carry different levels of intellectual, personal, social, emotional, and cultural. The background and

initial understanding brought by these students are very important by the teacher, in order to develop a more scientific knowledge [6].

It is necessary to change the mindset that is used as the basis of education. Learning activities should emphasize the process of how students should learn. Learning must change from just understanding to the application of scientific concepts and principles [9]. Learning activities are designed and developed based on the characteristics of essential competencies, competency standards, the potential of students and regions, and the environment. Following the elements of physics subjects, learning activities are carried out through process skills, including exploration (to obtain information, facts), experimentation, and problem-solving (to strengthen understanding of concepts and principles) [10]. Exploration activities (information and facts) are carried out to provide opportunities for students to construct knowledge according to the demands of essential competencies. Experimental activities are carried out to strengthen the competencies achieved. Meanwhile, problem activities carried out in class discussions aim to enhance competence in mastering concepts and principles in accordance with essential competencies [11].

In particular, there is a need for changes in the learning strategy of regular straight motion (GLB) and regular straight motion shift (GLBB) [12]. Learning that emphasizes the elaboration of formulas should be avoided. Instead, it should be done with a concept approach; concepts are built through student learning experiences through discussions in class, which involve mental and physical processes through interactions between students, students and teachers, the environment, and learning resources. Others to achieve essential competencies [13]. It was making concepts as the main menu and formulas into parts that must be found by students independently.

### RESEARCH METHODS

This study uses an action research design, which focuses on classroom activities so that the research is in classroom action research [14]. This study describes the learning process in understanding the concept of straight motion, which is a material to achieve basic competence in analyzing physical quantities in motion with constant speed and acceleration [15]. This research was conducted to develop a learning model to improve student achievement. The research was designed based on a study of learning theory and input from the field. The solution design in question is a formula-free learning model with a constructivist approach in teaching the subject of uniform, straight motion (GLB) and uniformly changing linear motion (GLBB) in class X-Nursing Assistant in the first semester (odd semester). Constructivism in this CAR has a role to actively build their knowledge based on knowledge and experience [16]. The research procedure is a classroom action research procedure that consists of 2 cycles. Each cycle is carried out following the learning organization strategy with the changes to be achieved.

The following image is the Classroom Action Research flow:

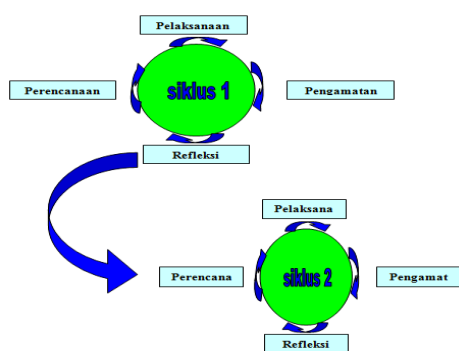


Figure 1. Classroom Action Research Flow

Figure 1 above describes two cycles in classroom action research; cycle one consists of planning, implementing, observing, and reflecting. Then based on this reflection, the second cycle is carried out again with the same steps as the first cycle so that the achievements are met. The research site was carried out at

SMK Negeri 28 South Jakarta, especially in the classroom. The location selection was carried out with consideration that the achievement of basic competence in analyzing the physical quantities of motion with constant velocity and acceleration in the previous year was low. This research was conducted from August to November. The study has two research variables, namely the action variable and the problem variable. The technique used in data collection is observation and tests.

### RESULTS AND DISCUSSION

The students who were the subjects of the research were students of class X-Askep, where the learning conditions so far were still weak with an indication of the low value of the average mastery of learning on the essential competencies of Measuring Physical Quantities (mass, length, and time) and Performing vector additions was 53, 42. Mathematics, especially algebra, is low as indicated by the achievement of competence in student learning outcomes 59,97.

It is also known that in physics learning activities in class X-Askep, students' learning motivation is still low. It can be seen that most students participate in passive teaching and learning activities. The number of students who actively respond to every explanation and teacher question is still few, and those who ask. Besides that, the difference between the national exam scores at the junior high school level and the results of the formative test 1 is very sharp. The first cycle consisted of four stages: planning, implementation, observation, and written tests, and reflection and re-planning. In this study, the first cycle consisted of two meetings.

The observations of teacher activities in the teacher in teaching and learning activities in the first cycle were quite good, with the acquisition of a score of 8.1 or 67.32% of the ideal score of 12. However, at the beginning of the teacher's activity, students did not ignore answers to

questions given by the teacher. The evaluation of mastery of the material is carried out in writing in a formative test. The student's knowledge of the learning material is still classified as lacking. From the excellent value of 100, the average grade score was only 59.1. If it is compared with the results of previous mastery of the material, there is an increase of 5.68 (59.1 – 53.42) even though the difficulty level of the material is more difficult than the previous material.

The results of the reflection of the first cycle are as follows; Some students are not familiar with the constructivism method with the concept learning model without formulas. However, PowerPoint presentations and questions lead students to find their concepts, make students interested, feel happy, and enthusiastic in learning. The implementation of classical discussions (students are not grouped) has not stimulated students to answer and ask questions actively. Have not been able to answer questions or complete assignments in the allotted time, the teacher does not go around the class to help students who are less or have not been able to answer and build concepts of learning material

The evaluation results in the first cycle reached an average of 59.1, with the highest score of 98 and the lowest being 29. The difference between the highest and lowest scores was huge. Then the second cycle was carried out; the second cycle consisted of planning, implementation, observation, and written tests, and reflection.

The results of teacher observations in teaching and learning activities in the second cycle showed a very significant increase, as indicated by the rise in the average score. In the second cycle, the average score of 37 or 84% of the ideal score is 44. Evaluation of mastery of the material is carried out in writing in the form of a formative test. In the evaluation results in the second cycle, there was a significant change in the average test score. The average value

obtained from evaluation cycle 2 is 74.80, so there is an increase of 15.7 from the average value obtained in evaluation cycle one.

Based on the results of data acquisition that has been described, the second cycle experienced very significant success. In contrast, the success obtained was that student activities in the teaching and learning process (PBM) had led to better constructivism learning. Students can build and also construct the knowledge they have acquired. So that students' understanding of the explicit motion material is better, this is indicated by the evaluation results at the end of the second cycle increasing from an average of 59.1 to 74.8. Changes in learning outcomes from the previous KD (KD.3.1) to cycle two shown by the graph below shows the comparison of KD 3.1 test results and cycle 1, cycle two from KD 3.1.

The increase in learning outcomes in each cycle can be seen in the following picture:

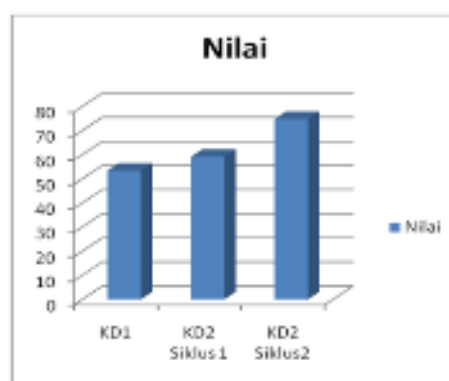


Figure 2. Learning Outcome Improvement Chart

Increased student activity in PBM is supported by increased teacher activity in maintaining student motivation, intensively guiding and encouraging students to participate in group discussions. The constructivism method with a learning model of understanding the concept of straight motion without elaborating the planned formulas can be implemented.

## CONCLUSION

Based on the results of classroom action research, it can be concluded that the application of constructivism learning with a conceptual model without formulas can increase the activity of the teaching and learning process; this learning model can eliminate the impression of students that learning physics is identical to memorizing formulas, through learning the constructivism method with this concept mastery model. Foster students' self-confidence because through the planned stages, students feel they have found recipes through understanding concepts; the results of observations in the second cycle show that student activity is excellent, namely 80.26%. Student mastery of learning materials showed a significant increase in learning that did not use this concept; the average value was 53.42, while with this model, the average value reached 74.8.

#### ACKNOWLEDGEMENT

The author would like to thank SMKN 28 Jakarta for facilitating this research to run well.

#### REFERENCES

- [1] A. E. Febriana and A. Q. Nada, "Identifikasi Miskonsepsi Siswa pada Materi Gerak Lurus Beraturan (GLB) dan Gerak Lurus Berubah Beraturan (GLBB)," *J. Kependidikan Betara*, vol. 2, no. 1, pp. 43–50, 2021.
- [2] Fitriani, R. Mirdayanti, and Bukhari, "Peningkatan Pemahaman Siswa Pada Konsep Gerak Lurus Beraturan dengan Metode Presentasi di MAN 3 Indrapuri," vol. 1, no. 2, pp. 165–171, 2020.
- [3] S. Prihatini, W. Handayani, and R. D. Agustina, "Identifikasi Faktor Perpindahan Terhadap Waktu Yang Berpengaruh Pada Kinematika Gerak Lurus Beraturan (GLB) Dan Gerak Lurus Berubah Beraturan (GLBB)," *J. Teach. Learn. Phys.*, vol. 2, no. 2, pp. 13–20, 2017.
- [4] D. Kurniawan, I. Sucahyo, and J. Fisika, "Perancangan Kit Percobaan Gerak Lurus Berubah Beraturan Pada Bidang Miring," *Jurna Inov. Fis. Indones.*, vol. 04, no. 03, pp. 84–88, 2015.
- [5] S. V. Deesera, Ilhamsyah, and D. Triyanto, "Rancang Bangun Alat Ukur Gerak Lurus Berubah Beraturan (GLBB) Pada Bidang Miring Berbasis Arduino," *J. Coding Sist. Komput. Untan*, vol. 05, no. 2, pp. 47–56, 2017.
- [6] R. E. Putra, "Peningkatan Hasil Belajar Siswa Menggunakan Pendekatan Konstruktivisme Dalam Pembelajaran IPS di Kelas IV SD Negeri 51/II Desa Paku Aji Kecamatan Tanah Sepenggal Lintas Kabupaten Bungo," *J. Muara Pendidik.*, vol. 3, no. 2, pp. 124–136, 2018.
- [7] S. Suparlan, "Teori Konstruktivisme dalam Pembelajaran," *Islam. J. Keislaman dan Ilmu Pendidik.*, vol. 1, no. 2, pp. 79–88, 2019.
- [8] S. Nasution and Zulheddi, "Pengembangan Model Pembelajaran Bahasa Arab Berbasis Teori Konstruktivisme di Perguruan Tinggi," *Arab. J. Arab. Stud.*, vol. 3, no. 2, pp. 121–144, 2018.
- [9] S. Mayasari, "Penggunaan Media Audio Visual untuk Meningkatkan Hasil Belajar Siswa pada Materi Gerak Lurus Beraturan di MTsS Darul 'Ulum Banda Aceh," *Fak. Tarb. dan Kegur. UIN Ar-Raniry Darussalam- Banda Aceh*, vol., no., p., 2017.
- [10] M. Febriani, "IPS dalam Pendekatan Konstruktivisme (Studi Kasus Budaya Melayu Jambi)," *AKSARAJurnal Ilmu Pendidik. Nonform.*, vol. 07, no. 01, pp. 61–66, 2021.
- [11] R. Fitri, "Pengembangan Perangkat Pembelajaran Berbasis Pendekatan Konstruktivisme Untuk Meningkatkan Kemampuan Pemahaman Konsep Pada Materi Persamaan Lingkaran," *JNPM (Jurnal Nas. Pendidik. Mat.*, vol. 1, no. 2, pp. 241–257, 2017.
- [12] T. Limbong, "Simulasi Implementasi Rumus Phytagoras dan Gerak Lurus Beraturan (GLB) dalam Aplikasi Game," *Pelita Inform. Budi Darma*, vol. 2, no., pp. 10–16, 2012.
- [13] M. Yusuf and W. Arfiansyah, "Konsep 'Merdeka Belajar' dalam Pandangan Filsafat Konstruktivisme," *AL-MURABBIJurnal Stud. Kependidikan dan Keislaman.*, vol. 7, no. 2, pp. 120–133, 2021.
- [14] Nurjanah, "Peningkatan Hasil Belajar

- Ipa Dengan Menerapkan Metode Inkuiri Siswa Kelas V Sd Negeri 68 Kec. Bacukiki Kota Parepare,” *J. Publ. Pendidik.*, vol. 6, no. 2, pp. 107–110, 2016.
- [15] A. Suaib, “Peningkatan Hasil Belajar IPA Terpadu Melalui Model Pembelajaran Kooperatif Tipe Jigsaw Pada Siswa Kelas VII SMP Negeri 5 Satap Liukang Tupabbiring,” *Al-Khwarizmi J. Pendidik. Mat. dan Ilmu Pengetah. Alam*, vol. 1, no. 2, pp. 23–40, 2018.
- [16] N. Binti Noralidin, “Pembinaan Model Pengajaran Kemahiran Menulis Karangan Berdasarkan Teori Konstruktivisme,” *Fak. Bhs. dan Komun. Univ. Pendidik. Sultan Idris*, vol., no., p. , 2017.