HIGH SCHOOL STUDENTS PROFILE OF MISCONCEPTION IN ROTATIONAL DYNAMICS

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Abstract

This research aims to describe student's profile of misconception on rotational dynamics before and after remidial instructions using beach ball discussion learning model. This research used pre-experimental design with one-group pre-test post-test design. Subjext of this research is 21 science class student in Lamongan, Indonesia. Before the instruction conduct, three-tier diagnostic test formatted pre-test is given to reveal student misconceptions profile. Physic instructions using beach ball discussion learning model then conducted. After the instructions, the same diagnostic test formatted was given as post-test. Collected data then analyzed to describe student misconceptions profile before and after the instructions. The result show that before the instructional there are misconception students got as average in every concept, after the instructions, misconceptions was reduced.
Keywords : Misconception, Remidial, Rotational Dynamics

Abstrak

Penelitian ini bertujuan untuk mendeskripsikan profil miskonsepsi siswa pada materi dinamika rotasi sebelum dan sesudah pembelajaran remidial dengan model diskusi tipe *beach ball*. Jenis penelitian yang digunakan adalah *pre-experimental design* dengan rancangan *one-group pre-test post-test design*. Subjek penelitian adalah 21 siswa kelas XI MIA di Lamongan, Indonesia. Sebelum dilakukan pembelajaran, siswa diberi *pre-test* berupa tes diagnostik miskonsepsi bertipe *three-tier* untuk mengetahui profil konsepsi awal siswa. Setelah dilakukan *pre-test*, pembelajaran remidial dengan model diskusi tipe *beach ball* dilaksanakan. Setelah pembelajaran dilaksanakan, siswa diberi *post-test* berupa tes diagnostik yang sama dengan *pre-test*. Data yang terkumpul dianalisis untuk mendeskripsikan profil konsepsi siswa sebelum dan sesudah pembelajaran. Hasil penelitian menunjukkan bahwa sebelum pembelajaran remidial secara rata-rata siswa mengalami miskonsepsi di setiap konsep dan setelah pembelajaran dilaksanakan jumlah miskonsepsi yang dialami siswa berkurang.
Keywords: Miskonsepsi, Remidial, Dinamika Rotasi

INTRODUCTION

Physics learning in schools requires students to be able to understand the concepts and theories of physics from the simplest to the complex. A good comprehension about physics concepts will be very useful in student's life. Moreover with a correct and intact comprehension of physics, student can develop the concept into a new discovery or technology that is more useful for human's life.

Students do not start learning physics without initial knowledge. They already have some initial knowledge about the physics concepts that they build or develop through their daily experience with physics phenomena around them and their experience of learning at previous levels (Mariawan, 2002). Sometimes, their initial knowledge is inconsistent with the concepts of physics that they get in learning or physics concepts that are understood by experts (Smith, 1993).

After formal learning in school, students will build new knowledge with an assimilation process accompanied by the teacher. Their comprehension becomes more profound, but the comprehension built by students after formal learning is not entirely the same as the comprehension possessed by experts. Misconception itself is the comprehension of a concept that is owned by someone where the concept is not in accordance with concepts understood by experts or concepts that are not in accordance with the scientific comprehension accepted by experts (Suparno, 2013).

Based on constructivism theory, when students acquire a new knowledge they will tend to relate it to the initial knowledge that they already have to make their own comprehension. The existence of this misconception

will prevent students in accepting and connecting new knowledge. it prevents them in process of further learning (Klammer, 1998). According to Van Den Berg in Tayubi (2005), one of the difficulties in physics learning is caused by misconceptions that sudent held.

Based on the results of several research about misconceptions that have been conducted, misconceptions occur almost in all physics material. One material that occurs a lot of misconceptions is the rotational dynamics. In a research conducted by Syahrul (2015) about the identification student's misconceptions in rotational dynamics material, students hold misconceptions in all concepts of rotational dynamics. Moreover, in the concept of rolling motion, 122 of 141 students hold misconceptions. In research that has been conduct by Herlina (2016) about the reduction of students' misconceptions in rotational dynamics, students hold misconceptions on all the concepts that tested during the pre-test.

Based on this data, researchers conducted a preliminary study at a high school in Lamongan. Preliminary studies carried out by conducting interviews with some students and provide a questionnaire in the form of questions related to the misconception in rotational dynamics. Based on the results of initial studies, 83% of students stated that some of the physics concepts taht they learned in the class did not fit the phenomena or reality around them. This shows that these students hold misconceptions. Based on the results of the preliminary study, researchers assumed that more research about identification of misconceptions that occurred in students for rotational dynamics material were needed.

METHOD

This research used pre-experimental design with one-group pre-test post-test design. Research data will be obtained in the form of numbers and the results are described qualitatively.

This research was conducted on a sample of 21 11th grade science students of state high school in Lamongan, Indonesia which has gained material rotational dynamic in the second semester of the academic year 2018/2019.

The research begins by giving a pre-test in the form of diagnostic tests to determine students' initial conceptions. After pre-test students were given teaching in materials rotational dynamics with beach ball discussion model, then students given the same test (posttest) to determine the students' conceptions after instructions.

Students' conceptions were analyzed based on a combination of the answers to the three-tier test in accordance with Table 1.

Tabel 1. Conception level based on combinations of answer of three-tier diagnostic test

Possible Options of Student Answers			Decision
Level 1	Level 2	Level 3	
Right	Right	Sure	Scientific Conception
Right	False	Sure	Misconceptions
False	Right	Sure	Misconceptions
False	False	Sure	Misconceptions
Right	False	Not Sure	Guessing
False	Right	Not Sure	Guessing
Right	Right	Not Sure	Lucky Guess
False	False	Not Sure	Lack of Knowledge

(Maulini, 2016)

Collected data in the form of answers to the pre-test, and post-test were analyzed descriptively and qualitatively for student misconceptions profile before and after instructions.

RESULTS AND DISCUSSION

Based on data from the pre-test and post-test, misconceptions percentage of students before and after instructions obtained shown in Table 2.

Table 2. Misconceptions before and after instructions

Concept	Before Instructions (%)	After Instructions (%)	Decrease in Misconceptions (%)
Torque	81,0	9,6	88,2
Rotational Inertia	71,4	14,3	80,0
Rotational Kinetic Energy	61,9	0,0	100,0
Angular Momentum	61,9	14,3	76,9

Based on Tabel 2, before the instructions there are sizeable misconception held by student, reached 81,0% in the concept torque, 71,4% in the concept rotational inertia, and 61,9% in the concept rotational kinetic energy and angular momentum. Most misconceptions occur in the concept torque and the least misconception

occurs in the concept rotational kinetic energy and angular momentum.

After the instructions, students misconceptions decreased; the concepts torque became 9,6%, the concept rotational inertia and angular momentum became 14,3%, and the concepts rotational kinetic energy became 0,0%. After instructions, the concept that still has the most misconceptions is the concept of moment of inertia and angular momentum. In the concept of rotational kinetic energy, after instruction, there is no more students experience misconceptions.

CONCLUSION

Based on the data from discussion above, it can be concluded that : there are misconceptions experienced by students in the material rotational dynamics in each concept; after instructions, misconceptions held bystudents was reduced in each concept of rotational dynamics.

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