Implementing Direct Instruction Model with Mind Mapping Method on Static Fluids

Julian Yudani, M. Arifuddin, Misbah, Dewi Dewantara
Physics Education, Universitas Lambung Mangkurat, Banjarmasin, Indonesia

Keywords: Learning Outcomes, Direct Instruction, Mind Mapping.

Abstract: Student physics learning outcomes is still low. So it needs to be improved by using certain models and methods. One of the ways is by implementing direct instruction Model with mind mapping method of physics learning. This type of research is a classroom action research that aims to improve students' physics learning outcomes by using direct instruction model with mind mapping method. The type of research is classroom action research that consists of 2 cycles. The research was conducted on the students of class XI IPA SMAN 11 Banjarmasin. A test was conducted to collect data onto student learning outcomes. Data were analyzed by describing the quantitative results obtained. Student learning outcomes of cycle I had not fulfilled the success indicator with the percentage of students who completed the classical by 54,84%. Student learning outcomes of cycle II increased to 90.91%. Thus, the conclusion is that students' learning outcomes of static fluid increases when a direct instruction model is applied using the mind mapping method.

1 INTRODUCTION

The common problems affecting the world of education in Indonesia and especially in SMAN 11 Banjarmasin is the low learning outcomes of students, especially on the subject of physics. Based on the final semester test results of SMAN 11 Banjarmasin on Tuesday December 06, 2016, the result of studying 38% of students of grade XI IPA is still below the minimum graduation criteria, which has been determined the school is 70. This shows the results of student learning in class XI IPA SMAN 11 Banjarmasin needs to be improved by using appropriate teaching models and methods.

Student learning outcomes, is the ability of students to meet a stage of achievement of learning experiences in one basic competence (Kunandar, 2007). Bloom mentioned that the learning outcomes consist of 3 domains: cognitive, affective, and psychomotor. Based on this, the learning process is characterized as a whole behavioural change both in terms of cognitive, affective and psychomotor. The process of change takes place, from the simplest to the most complex that is problem solving, and the importance of the role of personality in the process and learning outcomes (Ruhimat, 2011).

Student learning outcomes can be improved by the use of appropriate models and learning methods. Learning model used in this research is direct instruction model. The direct instruction model has been specifically designed to teach students about the procedural knowledge required to carry out complex and simple skills and well-structured declarative knowledge and can be taught step by step (Nur, 2011). Memorizing certain laws or formulas in the field Science is an example of simple declarative knowledge (factual information), whereas how to operate measuring tools of science is an example of procedural knowledge (Suyidno and Jamal, 2011).

Student learning outcomes can be improved by a method that can be incorporated into this direct instruction model, one of which can be used is mind mapping. Based on Skinner's theory, the mapping is an appropriate method of learning because all the reinforcing elements (reinforcement) described by Skinner such as fun, reward, conducive environments can be applied to learning by mapping approach.

Mind mapping is an effective visual technique that represents topics, ideas, or concepts with the help of shapes, images, and keywords (Balım, 2013). Mind mapping can be created using handwriting by combining colours, drawings as well as curved branches as desired, so mind mapping becomes not bored to be seen visually (Syahidah, 2015). Mind

Yudani, J., Arifuddin, M., Misbah, . and Dewantara, D.
Implementing Direct Instruction Model with Mind Mapping Method on Static Fluids.
DOI: 10.5220/0008409701930196
In *Proceedings of the 2nd International Conference on Learning Innovation (ICLI 2018)*, pages 193-196
ISBN: 978-989-758-391-9

mapping records all information through symbols, images, lines, words, and colors. The mind mapping used in this research is mind mapping type of spider (Swadarma, 2013).

The necessary tools are very simple, among them are paper sheets and colored pencils (Balım, 2013; Corwin, Smith and Dubois, 2016). In mind mapping, the main topic is depicted in the centre section, with branches extending out of this image. Branch of the main topic is a sub-theme. Keywords or images is used in each branch (Polat, Yavu and Tunc, 2017). In general, mind mapping is presented logically. This makes students highly motivated to learn the science aspects easily (Hallen and Sangeetha, 2015).

Physics learning by applying the mind mapping method of the direct instruction model can improve student learning outcomes (Venisari, Gunawan and Sutrio, 2015). The attractiveness of the view on the mind mapping and easy to understand by the students so much the better (Hallen and Sangeetha, 2015). Mind mapping can be done as an individual exercise or group exercise, at the beginning and end of learning (Corwin, Smith and Dubois, 2016).

The formulation of the problem of this research is how the student learning outcomes, using direct instruction model with mind mapping on physics learning in class XI IPA SMA Negeri 11 Banjarmasin?

2 METHOD

This type of research is a classroom action research that aims to improve students' physics learning outcomes. This research was conducted for 2 cycles. Each cycle consists of three stages: planning, action / observation, and reflection. Subjects in this study were students of class XI IPA SMA Negeri 11 Banjarmasin even semester (semester 2) academic year 2016/2017 which amounted to 34 people. The object of research is the result of student physics learning on the implementation of direct instruction model assisted mind mapping.

Techniques used in collecting data onto this study were a test, to determine student learning outcomes. The test was essay based on learning objectives as a description of basic indicators and competencies. The items that had been made are further validated by experts or practitioners, then tested the test instrument on students that have been taught the subject of static fluid.

Completeness of individual student learning, meet the criteria of success if students were able to achieve the minimum criterion value that had been determined by the school was 70, while the completeness of learning in classical meeting the criteria of success if the number of students who complete 70% of the total students in the class.

3 RESULT AND DISCUSSION

There are 7 items on the test result of learning cycle I according to the purpose of learning. At the first item, students were asked to explain what pressure means. The second item were to calculate the hydrostatic pressure in a certain depth. On the matter had been known the depth and mass of mercury species. The third item were a story about a driver of one of the flat tires, students are asked to answer why a pressure gauge gives a zero reading while there is still airing inside the tire. The fourth item, students were asked to explain the basic law of hydrostatics. The fifth item were to calculate the height of mercury in the U pipe. On the matter of known water level, the density of the water and the mass of mercury the seventh item is to analyze the ratio of water and kerosene in the tube. On the question has been known the density of water type, oil type mass, and hydrostatic pressure at the bottom of the tube.

Table 1: Recapitulation of the value of the student learning outcomes classically in cycle I.

Score range	Category	Frequency	Percentage
0 – 69	Not completed	14 students	45,16%
70 – 100	Completed	17 students	54,84%

Table 1 showed that the learning outcomes of students who completed classically in the first cycle amounted to 54.84% or had not achieved indicators of success. Therefore, efforts should be made to improved learning outcomes of cycle II. To improve students 'learning outcomes, the next step was to emphasized the students' ability to work on the physics problem by optimizing the explanation when delivering the material and sample questions.

The study continued to cycle II. In phase 1 of the direct instruction model, the researcher conveyed the learning objectives and prepared the students. The learning then proceeds with the next phase. Phase 2 researchers explained the material using mind mapping followed by explaining the example problem.

There are 6 items in the test results of learning cycle II in accordance with the purpose of learning.

At the first item, students were asked to explain about Pascal's Law. The second item was to calculate the force applied to a small suction by applying Pascal's Law. On the matter had been known the force on the large suction and cross-sectional area of each respirator. The third item was about analyzed the mass given to the cylinder in order for a balanced system to use Pascal's Law. On the problem had been known the force contained in the small suction, cross-sectional area of each type and the type of liquid. The fourth item, the students were asked to explain about the Law of Archimedes. The fifth item were to explain why a hot air balloon can apply the Law of Archimedes. The sixth item was to analyzed the density of objects dyed in water using the Law of Archimedes. On the matter had been known the weight of objects in the air, the weight of objects when immersed in water, and the density of water.

Table 2 shows that the learning outcomes of students who completed classically in cycle I amounted to 90.91% or have achieved success indicator. In phase 1 of the direct instruction model, the teacher conveyed the goals and prepared the students. The learning then proceeded with the next phase. Phase 2, the teacher explains the material used mind mapping followed by explaining the example problem. After the problem-solving steps were taught, the teacher guided the training to the students in phase 3 of the direct instruction model to work on the practice questions contained in the worksheet. Teachers checked understanding and provided feedback on students in phase 4. In this phase, the teacher asked student representatives to write their answers in front of the class. This was done to check students' understanding. The teacher then provided feedback, asked the other students to respond if the answer is different from the answer written in front of the class. Then the teacher provided reinforcement by explaining the correct answer. The last phase was to provide opportunities for advanced training and implementation (phase 5). The teacher provided advanced training on the worksheet and asked the students to make a mind mapping based on the material they have learned in the lesson.

Table 2 Recapitulation of the value of the test of student learning outcomes classically in cycle II.

Score range	Category	Frequency	Percentage
0 – 69	Not completed	3 students	9,09%
70 – 100	Completed	30 students	90,91%

Based on the data in Table 2, student learning outcomes in cycle II increased to 90.91%. Thus, direct instruction model with mind mapping could improve student learning outcomes. The study revealed that direct instruction model with mind mapping method can improve student learning outcomes (Venisari, Gunawan and Sutrio, 2015). Improving student learning outcomes can be done in direct instruction settings (Kamsinah, Jamal and Misbah, 2016; Ahliha, Mastuang and Mahardika, 2017). As for ways to improve student learning outcomes in addition to maximizing the time of learning, teachers also pay more attention to students who do not understand when learning, by asking the rest to respond, respond or ask about what has not been understood (Karim, Zainuddin and Mastuang, 2016).

Mind mapping also plays a major role in the increase in these learning outcomes. It is seen from almost all students in the class is not difficult in doing the problem because it has been explained by the teacher and some material summaries have been written in the form of mind mapping. The students showed more interest in learning the contents and to apply it more confidentially (Hallen and Sangeetha, 2015). Mind mapping is able to show how people understand certain concepts. In mind mapping, any idea can be linked to another (Balım, 2013). Mind mapping provides data onto changing students 'thinking, and helps visualize students' conceptual changes (Corwin, Smith and Dubois, 2016). All words and images on the mind mapping can serve as the center of another mind map and thus lead to new interaction patterns (Balım, 2013; Polat, Yavu and Tunc, 2017). This new interaction pattern is developed through each new word and image, and many variations will be added (Polat, Yavu and Tunc, 2017).

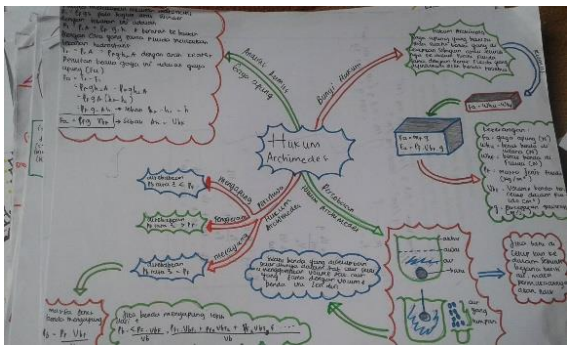

Figure 1. Student's mind mapping about Archimedes Law's.

4 CONCLUSIONS

The conclusion is that students' learning outcomes of static fluid increases when a direct instruction model is applied using mind mapping method. Student learning outcomes classically in cycle I and cycle II increased from 54.84% with the category not completed to 90.91% with completed category. Based on the objectives and conclusions of this study, the teacher has been able to solve the problem of low student learning outcomes at SMAN 11 Banjarmasin. Other researchers are also advised to apply the direct instruction model is applied using mind mapping method to solve similar problems.

REFERENCES

Ahliha, S., Mastuang and Mahardika, A. I. (2017) 'Meningkatkan Hasil Belajar Siswa Kelas VIII E SMP Negeri 26 Banjarmasin Dengan Menggunakan Metode Pemecahan Masalah (Problem Solving) Dalam Setting Pengajaran Langsung', *Berkala Ilmiah Pendidikan Fisika*, 5(1), pp. 118–132.

Balım, A. G. (2013) 'Use of technology-assisted techniques of mind mapping and concept mapping in science education: a constructivist study', *Irish Educational Studies*, 32(4), pp. 437–456. doi: 10.1080/03323315.2013.862907.

Corwin, J., Smith, J. G. and Dubois, B. (2016) 'Tools of the Trade Assessing Social Learning Outcomes Through Participatory Mind Mapping The Technique / Process', *Journal of Extension*, 54(1), pp. 1–6.

Hallen, D. and Sangeetha, N. (2015) 'Research Papers Effectiveness of Mind Mapping in English Teaching Among Viii Standard Students', *i-manager's Journal on English Language Teaching*, 5(1), pp. 45–50.

Kamsinah, D. L., Jamal, M. A. and Misbah (2016) 'Prosedural Siswa Melalui Model Pengajaran Langsung Pada Pembelajaran Fisika Di Kelas X 3 SMA Negeri 10 Banjarmasin', *Berkala Ilmiah Pendidikan Fisika*, 4(2), pp. 137–143.

Karim, M. A., Zainuddin and Mastuang (2016) 'Meningkatkan Keterampilan Proses Sains Fisika Siswa Kelas VIII SMP Negeri 2 Juai dengan Menggunakan Model Pembelajaran Inkuiri Terbimbing', *Berkala Ilmiah Pendidikan Fisika*, 4(1), pp. 35–42.

Kunandar (2007) *Guru Profesional Implementasi Kurikulum Tingkat Satuan Pendidikan (KTSP) dan Sukses dalam Sertifikasi Guru*. Jakarta: Raja Grafindo.

Nur, M. (2011) *Model Pengajaran Langsung*. Surabaya: Unesa University Press.

Polat, O., Yavu, E. A. and Tunc, A. B. O. (2017) 'The effect of using mind maps on the development of maths and science skills', *Cypriot Journal of Educational Sciences*, 12(1), pp. 32–45.

Ruhimat, T. (2011) *Kurikulum dan Pembelajaran*. Jakarta: PT RajaGrafindo Persada.

Suyidno and Jamal, M. A. (2011) *Strategi Belajar Mengajar Pegangan bagi Pembelajar Kreatif, Kritis, dan Inovatif*. Banjarmasin: Microteaching FKIP UNLAM Banjarmasin.

Swadarma, D. (2013) *Penerapan Mind Mapping dalam Kurikulum Pembelajaran*. Jakarta: Gramedia.

Syahidah, N. (2015) 'Metode Pembelajaran Mind Mapping Sebagai Upaya Mengembangkan Kreativitas Siswa dalam Pembelajaran Ekonomi', in *Prosiding Seminar Nasional Pendidikan Ekonomi FE UNY" Profesionalisme Pendidik dalam Dinamika Kurikulum Pendidikan di Indonesia pada Era MEA"*. Fakultas Ekonomi UNY, pp. 108–117.

Venisari, R., Gunawan and Sutrio (2015) 'Penerapan Metode Mind Mapping pada Model Dircet Instruction untuk Meningkatkan Kemampuan Pemecahan Masalah Fisika Siswa SMPN 16 Mataram', *Jurnal Pendidikan Fisika dan Teknologi*, I(3), pp. 193–198.