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DIVERSITIES OF STUDENT' LEARNING STYLE IN DISCOVERY LEARNING METHOD AND THEIR ABILITY IN PHYSIC PROBLEM SOLVING

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Abstract

The concept of physics can be understood through learning activities. Everyone has their own learning styles. For students, teaching and learning activities in the classroom physics with certain learning methods will slightly affect their learning styles. This article aims to determine how students' learning styles and their impact on physics problem solving. The subjects used were 66 students of Temanggung senior high school at grade 11 who were taught with the Discovery-Learning teaching method. Learning style questionnaire (LSQ) was given to the student to find out their learning styles distribution. Learning styles that used to classify are Honey-Mumford learning styles. The learning styles divided into 4 groups: Activists, Reflectors, Theorists, and Pragmatists. As the result, most students belong to the reflector learning styles.

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INTRODUCTION

The concept of physics becomes one of the difficult concepts to be learned by student because of its abstract and complex. According to Reddy & Panacharoensawad (2017) and Fisher (2013), physics, being an elemental science, due to its dominant problem-solving nature primarily attain its esteem as an arduous subject. Anyafulude (2014) argued that as a science subject, physics demands a lot of abstract thinking and requires the learner to store and manipulate much information at the same time in his/her memory. Further, learning activities are needed to understand physics concept. In general, students tend to carry out more learning process in the classroom activity which involves interactions between teacher and student. In this case, a teacher acts as a facilitator. A facilitator is defined as a person who manages the group process and help groups achieve their goals. As a teacher, the role of the facilitator has become almost synonymously associated with student-centered approach (Goodyear & Dudley, 2015).

To facilitate the process of knowledge transmission, a teacher should apply appropriate teaching methods suiting specific objectives and level exit outcomes (Ganyaupfu, 2013 & Mitchell,2020). Teaching method was also applied by a teacher to facilitate students for receive a lot of information effectively, and one of the several methods is discovery learning, that is one of the most popular teaching methods used by teachers, especially in developing countries, such as Indonesia. Curriculum 2013 revealed by Ministry of Education and Culture is demanding the creation of learning process that emphasizes personal experience, and the learning process like asked by Curriculum 2013 can be applied through a model of discovery learning where learning model uses a scientific approach in the stage of learning syntax (Khabibah, Masykuri & Maridi, 2017).

An experienced teacher should get to know his/her students to be successful during teaching (Eikichi, 2016 & Bambaeerro, 2017). One of the ten 21st century skills divided by The University of Melbourne-based and Cisco-Intel-and Microsoft-funded Assessment and Teaching of 21st Century Skills (AT21CS) consortium (2020) is learning to learn/metacognitive or knowledge about cognitive processes. In teaching and learning processes, students basically have the cognitive ability to understand a knowledge in different ways known as learning styles. Gilakjani (2012) and Sampson (2002) said that learning styles may be defined in multiple ways, depending upon one's perspective. According to Vaishnav (2013) and Kettanurak (2001), learning style can be described as a set of factors, behaviours and attitude that facilitate learning for an individual in a given situation.

Therefore, understanding students' learning style is important. This article aims to determine the classification of students' learning styles and their impact on physics problem solving in certain learning methods. The information we obtained can be used to improve the quality of teaching and learning activity. Learning style is an activity that possible to be observed, such as by questionnaire. One of the questionnaires developed for classifying student's learning styles was Honey-Mumford Learning Style Questionnaire by Peter Honey and Alan Mumford.

METHODS

Honey-Mumford learning style questionnaire was used in this study. The questionnaire was given to 66 students of grade 11 SMA Negeri 1 Temanggung, Central Java, Indonesia. They were taught by teacher that apply discovery learning as learning method for grade 10. Honey-Mumford learning style questionnaire by Peter Honey and Alan Mumford consist of 80 question point and classified to four different learning styles: activist, reflector, theorist, and pragmatist. Activists involve themselves fully in new experiences, reflectors like to observe from many different perspectives, theorist integrate observations into complex theories, and pragmatists are keen on trying out ideas, theorys and techniques.

Table 1 shows the distribution of statement points based on four aspects of the Honey-Mumford learning style. The maximum value of each aspect of the learning style is 20 and minimum at 0. The highest score indicates the dominance of the learning styles they have (Honey & Mumford, 1982;Claxton & Murrell, 1987).

It was translated to Bahasa according to the language that student speak with. A total of 66 samples that divided into two class were collected. Before the survey was conducted, short

briefing has been made. Each student took 20 to 25 minutes to complete the questionnaire.

Table 1. Grouping table of Honey-Mumford Questionnaire points

Point	Point	Point	Point
2	7	1	5
4	13	3	9
6	15	8	11
18	16	12	19
17	25	14	21
23	28	18	27
24	29	20	35
32	31	22	37
34	33	26	44
38	36	30	49
40	39	42	50
43	41	47	53
45	46	51	54
48	52	57	56
58	55	61	59
64	60	63	65
71	62	68	69
72	66	75	70
74	67	77	73
79	76	78	80
Activist	Reflector	Theorist	Pragmatist

The physics problems given to the students as the second instrument. Analysis was made from the result that given by the students then linked to their learning style. Thus, we can find the problem-solving characteristics of each learning style.

RESULTS AND DISCUSSION

A total of 66 students who were divided into two classes had already complete the questionnaire given. Then, the results of the questionnaire were analyzed by adjusting the students' response to the grouping table of learning styles type that have been compiled by Honey & Mumford.

Table 2. Total number of students for each learning styles

Learning style	The number of students
Activist	12
Reflector	46
Theorist	8
Pragmatist	0

Table 2 shows the majority of learning styles emerged by student were reflector learning styles and the others were distributed in two groups, activists and theorists. The distribution of learning styles shown then linked to the results of students' work in solving physics problems.

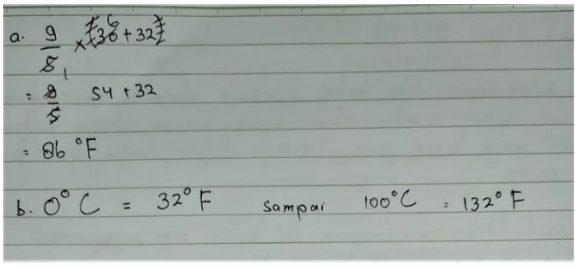

Figure 1. The answer for question point a and b from the student who learn with active learning style.

When they solve their physics problems, most of the students included in active learning style (activist) demonstrate a simple answer process. Although some students are unable to provide the correct answer to the question points a, they seem got difficulty to show their way of thinking to solve problems systematically. When they tried to solve the problem point b, they were not enabled to connect between the knowledge possessed the knowledge required to question. As example shown in Figure 2, the question point b has not resolved correctly.

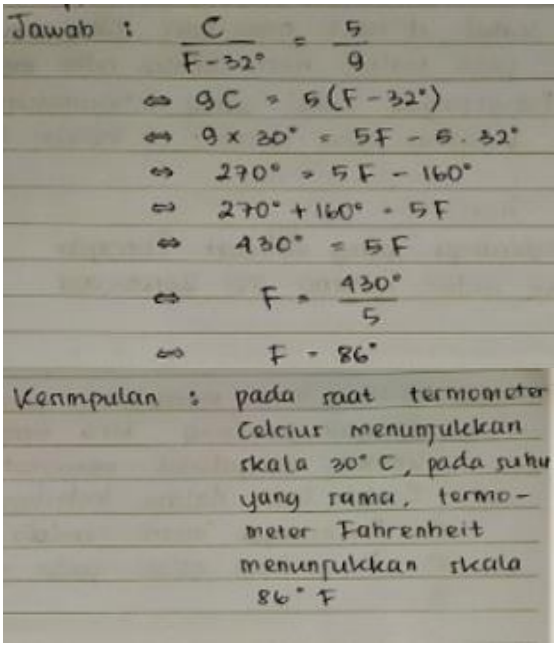

Figure 2. The answer for question point a from the student who learn with reflector learning style

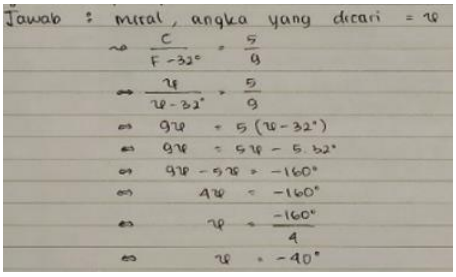

Figure 3. The answer for question point b from the student who learn with reflector learning style

Students with reflector learning styles find it easier to express their thoughts. It was shown from how he/she solves the problem, one of them are shown in Figure 2 and Figure 3. The students solve the problems given by teacher coherently and systematically, and both of a and b have been solved correctly.

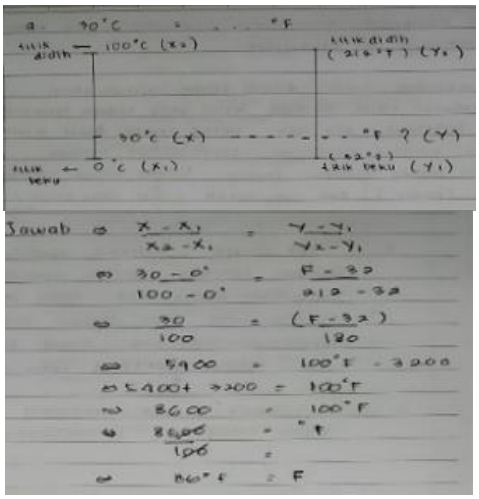

Figure 4. The answer for question point a from the student who learn with theorist learning style

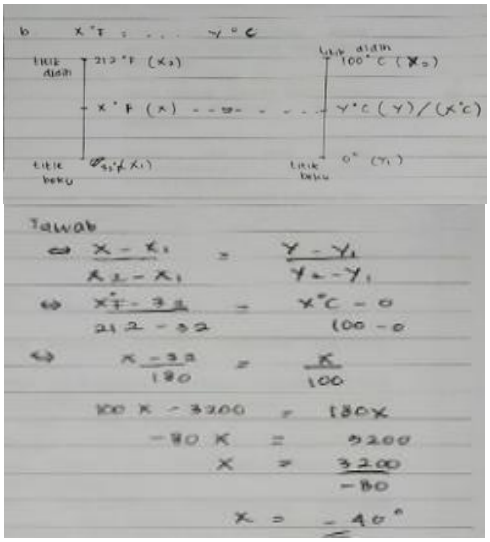

Figure 5. The answer for question point b from the student who learn with theorist learning style

On the other hand, Figure 4 and Figure 5 shows that students with theorist learning styles tend to do the analysis before giving a solution. They seem to solve the problem using logic. Even, some students have their own ways to solve the same problems which is different from the other students.

Furthermore, the student learning styles has been influenced by the teaching methods. The teaching method used by teacher, i.e., discovery-learning method is slightly may affect and shape the way of how students think, learn, and understand the physics concept given. Sarabdeen (2013) and Pritchard (2017) said that activist learns by doing participation, reflector learns by watching others and think before act, theorist learns by understanding theory very clearly, and pragmatist learns by trough practical tips and technique from experienced person. The reflector and theorist learning style become dominant due to the characteristic of discovery learning that support this learning style.

The effect of the method is less on the activist learning style. Student who learns in active learning style group feel hard to express ideas through their handwriting. Their thought processes become difficult to observe. This is possible because they are not able to follow or adapt to the teaching methods used by the teacher so that students are not optimal in building their own knowledge and receiving information that provided by the teacher. Lack of information possessed by students makes lack confidence in expressing their thoughts.

Discovery learning method gives a great support on reflector learning styles. Student who learns with reflector style seems feel comfortable to learn in the environment created by this method. A positive impact is also given to the theorist learning styles. Students who learn with theorists' style then able to explore their knowledge further so that they can solve problems with a different approach. Both those who learn with reflector and theorist styles, they can express their idea more freely and deeply regardless of the right or wrong answers they give.

CONCLUSION

The results of the questionnaire show that in general, the learning styles formed by the discovery learning method led to reflector learning styles. Students with an active learning style look less compatible with this learning method. For this reason, it is necessary to apply other teaching methods that support the Discovery-Learning method so the students with other learning styles (especially activists) can be optimally facilitated.

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