Perceptions of high school physics teachers regarding the use of concept maps in physics learning

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Perceptions of High School Physics Teachers Regarding the Use of Concept Maps in Physics Learning

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Abstract. This study aims to describe the perception of high school physics teachers regarding using concept maps in physics teaching. In this descriptive quantitative research, data were collected using 15-item questionnaires. The subject research were nine physics teachers from SMAN 5 Palembang, SMAN 15 Palembang, and SMAN 18 Palembang. The results showed that physics teachers had very positive perceptions or agreed with using concept maps for physics teaching. This study suggests that the teacher's perception of the concept map can be well received, and the use of the concept map was very impressive in the physics learning process. This is because the concept map aims to study how students master physics learning, express misconceptions, and as an evaluation tool for teachers.

INTRODUCTION

Concept maps are one of the ways that teachers can use to determine the extent to which students understand physics concepts [1]. Concept maps can help teachers evaluate teaching and identify misconceptions and low levels of understanding of students' concepts. The concept map used by physics learning teachers can be structured and directed.

The role of concept maps for teachers as an assessment tool is to describe students' conceptual development and identify misconceptions. In the world of education, teachers use concept maps as an evaluation instrument for the level of knowledge of students [2]. They can help students in the process of learning facilities [3]. Using concept maps as an evaluation of teaching requires the teacher to know the concept map itself. Teachers using the concept map learning method will make it easier to teach concepts to students because each concept is meaningfully connected [4].

Suppose the teacher has a problem due to lack of knowledge of the methods for teaching a concept. In this case, it will affect the lo understanding of students' concepts [4] and the decrease in physics learning outcomes. Thus teachers improve the quality of learning in various ways [5]. With the concept map, teachers can quickly observe the improvement of conceptual learning based on students' knowledge, understanding, and problem-solving ability.

The teacher's point of view on concept maps states that concept maps are very important and have an effect on physics learning. So, the teacher's perception is needed to determine the effectiveness of the use of concept maps because the teacher is evaluating teaching and identifying misconceptions about the level of understanding of concepts. The perception in this study will be obtained by the teacher's positive or negative view of the use of concept maps in physics learning. The responses obtained later will be in the form of positive or negative responses that will affect existing actions.

METHOD

The method used in this study is a quantitative descriptive method, research is conducted to provide a more detailed picture of a symptom or phenomenon [6]. The data collection technique by providing questionnaires to respondents directly. The subjects in this study were nine high school teachers who taught physics at SMAN 5 Palembang, SMAN 15 Palembang, and SMAN 18 Palembang at the beginning of the odd semester of the 2022/2023 academic year. The

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data collection instrument used was a questionnaire with as many as 15 question statements in the form of a table using a likert scale. Data were collected by distributing questionnaires in the form of a Likert scale with indicators with five alternative answers namely, strongly agree with a score of 5, agree with a score of 4, hesitate with a score of 3, disagree with a score of 2 and strongly disagree with a score of 1 [7]. The results of respondents' answers to statements given to measure physics teachers' perceptions of the use of concept maps in physics learning.

TABLE 1. Questionnaire Instrument.

Indicator	Number of Grains	Item Number on The Instrument
Teaching and learning	3	1, 2, 3
Making it easier for students	4	4, 7, 8, 9
Increase interest	1	5
Improving skills	1	6
Making it easier for teachers	5	10, 11, 12, 13, 14
Save time	1	15

The questionnaire given was in the form of a list of questionnaire statements that were given directly to respondents while in school. After conducting research and obtaining data from respondents, the collected data are all analyzed. After the data were obtained, Data were managed by editing, coding, tabulating, reducing data, presenting data, and verifying data and conclusions. The data obtained from this study was used to determine the perception of high school physics teachers regarding the use of concept maps in physics learning.

RESULTS AND DISCUSSION

Research Result of Question Item

The indicators included in the questionnaire were regarding teaching and learning, making it easier for students, increasing interest, increasing proficiency, making it easier for teachers, and saving time. Filling out this questionnaire has several choices of answer statements, and respondents must choose one of the statements provided. Then, the completed questionnaire is analyzed based on the answer choices of the respondents who have been selected and then calculated the percentage of each statement. For the results of the data can be seen in Figure 1.

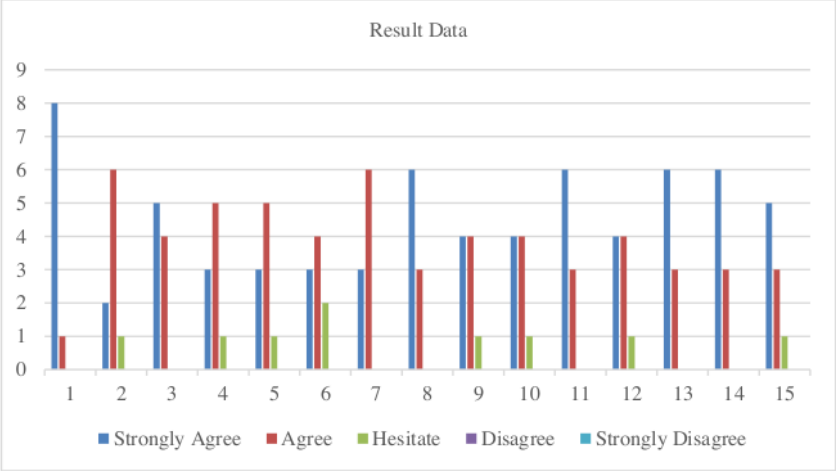

FIGURE 1. Result Data.

Of the nine respondents, in the statement (1) The concept map in teaching can help achieve the teaching objectives, those who chose a strongly agreed statement as many as 8 teachers or 89% of respondents and who chose a statement agreeing 1 teacher or 11% of respondents because teacher thinks the concept map is effective in helping teachers to achieve the desired teaching. Concept maps can assist teachers in improving the efficiency and effectiveness of teaching [8]. According to Cooper & Zimmerman [9], concept maps help identify specific areas for teachers to

concentrate on when planning teaching [9]. The purpose of teaching is to change the behavior of students as determined by the curriculum [10]. So, it can be concluded in statement number one that teachers give positive responses or strongly agree that concept maps can help achieve teaching goals.

In the statement (2) The concept map can produce student-centered teaching, of the nine respondents who chose strongly agree as many as 2 teachers or 22% of respondents, who chose to agree as many as 6 teachers or 67% of respondents, and those who chose to hesitate 1 teacher or 11% of respondent. Teachers strive to adopt modern teaching methods that maximize students' roles and make students the core of the educational process [11]. The 2011 TIMSS report emphasizes the importance of teaching methods that make students pedagogical centers, bring activities to life, and stimulate students' thinking levels. So, it can be concluded in this statement that teachers giving positive or agreeing responses regarding concept maps can result in student-centered teaching.

In statement (3) The concept map can make the teaching process more enjoyable, of the nine respondents who chose to strongly agree, as many as five teachers 56% of respondents, who chose to agree as many as 4 teachers or 44% of respondents. In the teacher's view, with the concept map, teaching is easier and more fun and the existing material can be easily understood. Teachers as educators who must be skilled, proficient and competent in teaching so that learning becomes fun and causes interest in learning students [12]. So, it can be concluded in this statement that teachers give positive or strongly agreed responses about concept maps can make the teaching process more enjoyable because with the concept map the lesson is clearer.

In the statement (4) The concept map can help students in doing the problem correctly, of the 9 respondents who chose to strongly agree as many as 3 teachers or 33% of respondents, who chose to agree as many as 5 teachers or 56% of respondents, and those who chose to hesitate 1 teacher or 11% of respondent. In this statement that teachers give positive or agreed responses about the concept map can help students in doing the problem correctly because the concept map of important points in the subject matter is easy for students to remember so that students can answer questions because the concept map can also clarify wrong or opposite views about a concept [13]. The use of concept maps in teaching activities can help students in improving good learning gains [14]. Because the concept map itself is structured in the delivery of the material so that students will find it easier to remember the physics material so that students can solve the problem correctly.

In statement (5) The concept map can increase students' interest in learning physics, from 9 respondents who chose strongly agree as many as 3 teachers or 33% of respondents, who chose to agree as many as 5 teachers or 56% of respondents, and those who chose to hesitate 1 teacher or 11% of respondent. Concept maps can improve learning achievement and the interest of students and students who are taught with concept maps will get good things [15]. With the use of concept maps, students will always be encouraged to find a relationship between concepts and students will build their understanding conceptually. So, it can be concluded in this statement, number that teachers giving positive or agreeing responses regarding concept maps can increase students' interest in physics learning.

In the statement (6) The concept map can improve the high-level thinking skills of students, from 9 respondents who chose strongly agree as many as 3 teachers or 33% of respondents, who chose to agree as many as 4 teachers or 45% of respondents, and those who chose doubtful 2 teachers or 22% of respondents. The benefits of concept maps for students are that they increase the activeness and creativity of students' thinking, this will cause an attitude of learning independence that is more in the students themselves. So, it can be concluded in this statement, that teachers give positive responses or agree that concept maps can improve students' high-level thinking skills.

In the statement (7) The concept map can make it easier for students to master physics learning, of the 9 respondents who chose to strongly agree as many as 3 teachers or 33% of respondents, who chose to agree as many as 6 teachers or 67% of respondents. The use of concept maps is a way of learning that will increase students' understanding and memory [8], so that students will be easier to understand and understand physics material. So, it can be concluded in this statement, that teachers give positive or agreed responses about concept maps can make it easier for students to master physics learning because with the concept map important points in physics subject matter can be easily remembered and understood.

In statement (8) The concept map can make it easier for students to remember and decipher important facts more quickly, from 9 respondents who chose strongly agree as many as 6 teachers or 67% of respondents, who chose to agree as many as 3 teachers or 33% of respondents. The use of concept maps has a very positive impact on the teaching and learning process. The learning achievement of students who are taught using concept maps is higher than that of students who are taught without using concept maps [16]. In this statement, that teachers give positive or agreed responses about concept maps, it can make it easier for students to remember and decipher important facts more quickly because with the concept map important points in physics subject matter can be easily remembered and understood in a structured and directed manner.

In the statement (9) The concept map can make it easier for teachers to attract students to learn, of the 9 respondents who chose to strongly agree as many as 4 teachers or 44% of respondents, who chose to agree as many as 4 teachers or 44% of respondents, and those who chose to hesitate 1 teacher or 12% of respondent. The use of concept maps in physics learning attracts students in the learning process so that they understand the material at hand. So, it can be concluded in this statement, that teachers give positive responses or agree that concept maps can make it easier for teachers to attract students to learn.

In the statement (10) The concept map makes it easier for teachers to design and implement physics learning, of the 9 respondents who chose to strongly agree as many as 4 teachers or 44% of respondents, who chose to agree as many as 4 teachers or 44% of respondents, and those who chose to hesitate 1 teacher or 12% of respondent. The use of concept maps can assist teachers in teaching, designing and implementing physics learning. So, it can be concluded in this statement, that teachers give positive responses or agree that concept maps make it easier for teachers to design and implement physics learning.

In statement (11) The concept map can make it easier for teachers to interact with students, of the 9 respondents who chose to strongly agree as many as 6 teachers or 67% of respondents, who chose to agree as many as 3 teachers or 33% of respondents. With the concept map, it helps teachers be more concise in delivering the material and the material provided is conveyed easily to students. So, it can be concluded in this statement, that teachers give positive responses or strongly agree that concept maps can make it easier for teachers to interact with students.

In statement number (12) The concept map can make it easier for teachers to provide teaching materials, of the 9 respondents who chose to strongly agree as many as 4 teachers or 44% of respondents, who chose to agree as many as 4 teachers or 44% of respondents, and those who chose to hesitate 1 teacher or 12% of respondents. Concept maps make it easier for teachers to make teaching materials because the material on the concept map is structured and important points are well arranged. Teaching materials are a set of materials that contain material or content that is compiled systematically and includes competency standards that will be mastered by students in the learning process [17]. So, it can be concluded in this statement, that teachers give positive responses or agree that concept maps can make it easier for teachers to provide teaching materials.

In the statement (13) The concept map can make it easier for teachers to carry out the teaching activities that have been designed, of the 9 respondents who chose to strongly agree as many as 6 teachers or 67% of respondents, who chose to agree as many as 3 teachers or 33% of respondents. The use of concept maps is useful for teachers, one of which is that the concept map can make it easier for teachers to carry out teaching activities. So, it can be concluded in this statement, that teachers give positive responses or strongly agree that the concept map can make it easier for teachers to carry out the teaching activities that have been designed.

In statement (14) The concept maps can save learning time, of the 9 respondents who chose to strongly agree as many as 6 teachers or 67% of respondents, who chose to agree as many as 3 teachers or 33% of respondents. In this statement, that teachers give positive or strongly agree with the concept map can save time in the learning process. With the delivery of clear and concise physics material using a concept map, it will save a little time for the learning process and students also understand the material presented.

In the statement (15) The concept map can make it easier for students when repeating learning, of the 9 respondents who chose to strongly agree as many as 5 teachers or 56% of respondents, who chose to agree as many as 3 teachers or 33% of respondents, and those who chose to hesitate 1 teacher or 11% of respondent. In this statement, that teachers give positive responses or agree that concept maps can make it easier for students when repeating learning. Physics material with important points that have been given with the use of concept maps that have been designed to be structured, directed and interesting, it will be easier for students to improve the material presented by the teacher.

Discussion

The purpose of this study is to get an idea of the perception of high school physics teachers regarding the use of concept maps in physics learning. The respondents in this study consisted of 9 physics teachers who were divided into SMAN5 Palembang, SMAN 15 Palembang, and SMAN18 Palembang. Physics teachers as respondents have a very positive or agreeing choice of answers on average for the use of concept maps.

Learning using concept maps has many benefits and goals for teachers. The benefits of learning using concept maps are [8]: 1) concept mapping is the best way to display the subject matter. 2) concept mapping helps teachers choose teaching rules, this is because many subject matters are presented in a random order. 3) help teachers improve the efficiency and effectiveness of their teaching. The important objectives of using concept maps in the learning

process are [18]: 1) investigating what has been known by students. 2) learn how learners learn. 3) express misconceptions that arise in learners. 4) as an evaluation tool for teachers.

From the data from the research results with physics teachers obtained that the data on the highest number of scores with a score of 75 points and the data on the lowest number of scores with a score of 60 points then the average highest score of 5 and the lowest average score of 4. With the average answer showing a picture of the teacher's response is very good or very positive to the use of concept maps in learning. Data analysis of the results of research that has been carried out shows that teachers' perceptions or views on concept maps can be categorized as very good and the use of concept maps for teachers can be a teaching tool, making it easier for students and teachers in the learning process, increasing the interest and proficiency of students and saving learning time.

From the results obtained, it can be implied that the teacher's response to the use of concept maps is very positive or very accepted to physics learning in schools. This is because the concept map as a tool in learning according to research [19] and the concept map makes it easier for teachers in the teaching and learning process and as an evaluation tool and with the concept map, learning that can strengthen students to face problems according to Humairah [20], use of concept maps aims to increase students' interest and motivation to learn so as to improve mastery of concepts [20].

This study is almost the same as that conducted by Daud & Rahman (2020) respondents in their study involving 103 teachers consisting of 31 male teachers (30.1%) and 72 female teachers (69.9%) SMK Terengganu Malaysia in his research, it is stated that the perception on the use of the thought map is very memorable and the perception on the use of the i-Think thought map can play an important role in influencing one's view to accept the i-Think thought map in teaching and learning, especially for teachers [21]. The second study conducted by Demirci & Memiş [22] respondents in their research involved 47 science teachers about testing the views of science teachers on the use of concept maps in learning. The results obtained by our research show that teachers have a positive view of the concept map. In his research, it is stated that science teachers intend to use concept maps in their teaching experience from all the difficulties faced by students in the learning process so that students understand the important points in each physics material taught [22]. The third study conducted by Didiş, et. al. [23] involved 8 prospective physics teachers. Concept maps play an important role in teaching, learning and curriculum. The results of this study show that physics teachers' knowledge of concept mapping, hidden elements that influence their ideas about the application of concept mapping in physics classes, and the relationship between knowledge [23].

CONCLUSION

Based on the analysis of data and the discussion of research results that have been obtained from filling out questionnaires by physics teachers, it can be concluded that the views of high school physics teachers regarding concept maps are very positive or very agreeable. This research suggests that the teacher's image or view of the concept map is well accepted and the use of concept maps is very effective in the physics learning process. This is because the concept map aims to learn how students master physics learning, express misconceptions, and as an evaluation tool for teachers.

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