Eliminate Misconception in Learning

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Abstract—**This article aims to examine the actions taken by the teacher to eliminate misconceptions in learning, the focus of which is to explore the actions taken by the teacher towards students either through learning media or learning models. Three strategies are used to identify the studies included in the review: (a) search for reference databases, (b) journal searches, and (c) prior research searches (i.e. review of reference lists from relevant literature reviews and relevant articles). The literature review was conducted to find methods developed to eliminate student misconceptions. The conclusion is that students' ability to understand concepts must be supported by learning media or learning methods so that misconceptions do not occur. Especially if the sub-subjects are required to do lab work. Then the practicum becomes mandatory, if not, students will experience difficulties in understanding, especially if it is only limited to the concepts described verbally.**

Keywords—misconception in learning; eliminating misconceptions; learning methods

I. Introduction

Conceptual change is defined as the ability to restructure student knowledge based on everyday life experiences and lay culture [1]. There are very necessary conditions that lead to conceptual changes in students, such as dissatisfaction, clarity, sense, and results [2]. As stated by Hewson et al., this process is not about providing students with new information; on the contrary, this involves the interaction of new knowledge with existing knowledge [3]. Various authors most often analyze conceptual changes in two ways: either as (1) weak knowledge restructuring, conceptual assimilation or retrieval or (2) strong / radical knowledge restructuring, conceptual accommodation or exchange by adding uncertainty to the increase in simple knowledge for this process or not add it [4]. The first step to eliminate misunderstandings that are considered as obstacles to the emergence of meaningful learning and achieving the desired goals in education is to determine misunderstandings [5].

Misunderstandings arise from the fact that students configure concepts in their minds in ways that are consistent with their own understanding and learning and if we define misunderstandings in a simple way; it is a concept that is scientifically inaccurate but understood by students in their own way [6,7]. It appears that different terms have been used to name these structures in students' minds such as misconceptions, wrong opinions, preconceptions, alternative structures, momentary reasoning, spontaneous ideas and alternative frameworks [8-12].

When the effects of different methods on conceptual change, the following methods have been implemented efficiently in eliminating misconceptions: computer-aided 3D teaching materials [13], computational materials and 5E models [14], explanatory stories [15], integrative teaching methods [16], concept maps [17], and cooperative learning [18]. Among these methods, different events that can be demonstrations or phenomena have been reported to achieve conceptual changes in the minds of students by contrasting their knowledge in this process [19]. Therefore, the meaning of general concepts must be conceptualized and transferred to students correctly to build relationships in the right way [20].

Misconceptions can occur when students are trying to shape knowledge by translating new experiences in the form of initial conception [21]. Educational experts in the field of misconception find other things that are the cause of misconceptions among students, including from the students themselves, teachers, textbooks, and learning methods used by students in learning [22]. Students who experience misconceptions can also be caused by students' difficulties in understanding concepts [22].

The following discussion is structured as follows, the first "background" of this study by providing a brief description of eliminating misconceptions in learning. Next, look for and select the relevant study literature before being reported and analyzed in the method section. After this study was identified, it produced the findings discussed in the results section with the conclusion of the literature study that had been carried out.

II. Theoretical Framework

A. Misconception

A misconception is a mistake in understanding a concept that is shown by an error in explaining a concept with its own language [23]. While the notion of misconception according to Jeanne is a belief that is not in accordance with the explanation that is generally accepted and proven to be invalid about a phenomenon or event [24]. The misconception has been around for a long time and has long been the core of empirical research in science learning so that scientific writings have emerged for a long time. The emergence of the most misconceptions is before it enters a process called preconception [25]. This preconception comes from the minds of students who are still

limited to the surrounding nature or other sources that they consider to be more familiar but cannot be justified.

B. Eliminate Misconception

Misconceptions that can be overcome sometimes reappear under certain conditions. When students face a slightly distorted problem, sometimes misconceptions reappear and bring the wrong effects. There are several elements that have been formulated by the researchers on how to overcome misconceptions, including the following:

- Identifying student preconceptions. What is in the minds of students before we begin teaching? What preconceptions have been formed in students' minds about the experiences and events that will be studied? What is the lack of preconception?

- Pre-conception can be known from the literature, from diagnostic tests, and from observing student activities.

- Designing learning experiences that depart from preconception by strengthening the concepts that are correct and evaluating concepts that are still wrong. The main principle in evaluating misconceptions is that students carry out learning experiences that show conflicting concepts with natural events. Thus it is expected that there will be a conflict between new experiences and old concepts so that there is a conception of correction (cognitive dissonance theory, Festinger). According to Piaget, the contradiction between new experiences and the wrong concept of accommodation will occur, namely the adjustment of cognitive structures that produce new concepts that are more appropriate.

- Increase practice questions to train new concepts and strengthen them. The questions that are done are really chosen in such a way that the difference between the wrong concept and the correct one will appear clearly. Things that can be done by the teacher to help students understand the correct concept by discussing the problem by paying attention and understanding the correct concepts to students. Teachers don't just write many formulas on the board or just do lectures without interaction with students.

III. METHOD

A. Literature Search

Three strategies are used to identify the studies included in the review: (a) search for reference databases, (b) journal searches, and (c) prior research searches (i.e., review of reference lists from relevant literature reviews and relevant articles). The literature review was conducted to find methods developed to eliminate student misconceptions. Some databases including Researchgate, ScienceDirect, ERIC, Sage Journals and, Google Scholar are traced using the keywords "Misconception", "Eliminate Misconception", and "Misconception in learning". After that, references in articles were used to find more studies, only articles published in the last few decades were included in this review, due to the

limited number of studies, so this study limits content to reviews with summaries of each research result or journal.

The study of students and teachers regarding misconceptions that occur in learning, whether it is the difficulty of students in understanding the concept of learning and the concepts taught are not delivered with learning media. There are already many learning media and can be a solution to eliminate misconceptions. In some studies, it is not entirely clear what learning media are used to eliminate misconceptions in students. This is why we use the author's description of their subject in the description of our study, a study in which several groups of students were given action by using learning media to then be investigated and included, although in describing this study.

In addition to using learning media, learning methods can be made as special actions to eliminate student misconceptions. In some subjects where there is no direct practice, the need for appropriate learning methods is very important to convey the concept. This concept is then understood by students so that they can eliminate misconceptions.

B. Review Finding

A total of 30 actions were taken to eliminate misconceptions in learning from a total of 100 studies published collectively, according to criteria that could eliminate misconceptions.

C. The Coding Scheme

The coding scheme was adapted from a structured / systemic approach to the literature review. The approach uses four main categories in analyzing articles, namely as follows: (1) Basic data: author, year of publication, journal, place of study (2) Research methods: research approach, method, theme, data collection, method of analysis, research results (3) Content analysis: Misconceptions in Learning, Eliminating Misconceptions (4) Discussion: issues discussed, future instructions, personal comments.

These four coding fields enable researchers to systematically study trends, problems, and possibilities that arise in the direction of future research. Personal comments are the result of questions and understanding that arises from researchers about the literature review.

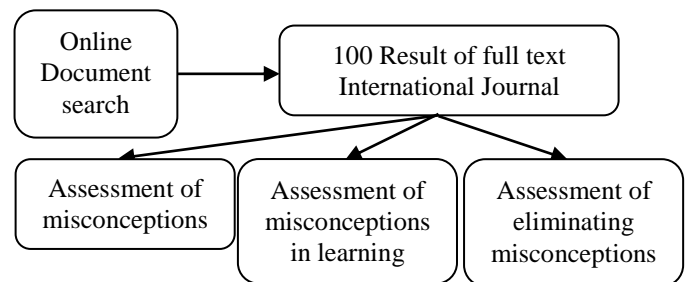The flow in the search for the results of the research document is carried out as follows.

Fig. 1. Document search process chart.

IV. RESULT AND DISCUSSION

Percentage of student misconceptions is different in each subject studied. Even when the subject matter is different, students will adjust again and experience new misconceptions. There need to be interactive media and learning models that can concretely eliminate misconceptions.

Various kinds of learning material conditions and situations are carried out, so solutions will be needed to eliminate misconceptions. The most frequently used method is to use interactive media in the form of images, videos, and simulations. If the learning material does not require interactive media, the solution to solving the problem is to use the right and effective learning methods.

One of the obstacles is that the teacher cannot explain clearly and visualize it into a form of understanding that is easily accepted by students. Through learning media, students can easily understand and visualize learning material. The process that is carried out is by dividing in two classes which are given different actions. The experimental class is given learning using learning media while the control class is given learning without using learning media. The result is that learning media can reduce students' misconceptions in understanding learning material.

Some learning models can also be used to reduce misconceptions that occur in students because the learning model students can want to face their own prejudices.

V. CONCLUSION

The importance of specific actions carried out by teachers in each subject and each sub-subject is inseparable from differences in students' ability to understand the concept. The use of learning media and variations in learning methods can facilitate students in understanding the concept.

Students' ability to understand concepts must be supported by learning media or learning methods so that there is no misconception. Especially if the sub-subjects are required to do lab work. Then the practicum becomes mandatory, if not, students will experience difficulties in understanding, especially if it is only limited to the concepts described verbally.

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