Learning Activities Based on Learning Cycle 7E Model: Chemistry Teachers' Perspective

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ABSTRACT
This research used descriptive qualitative approach. Research is conducted to show effectiveness of learning activities based on learning cycle 7E model by chemistry teachers' perspective. Data collected through an open-ended questionnaire which consist of 8 item that is 7 phases learning cycle 7E model and 1 effectiveness of learning cycle 7E model activities on acid-base concept. Purposive sampling was used in this research and there were 12 chemistry teachers that teach class XI in Yogyakarta city. Activities of learning cycle 7E model consists of 7 phases, namely elicitation, engagement, exploration, explanation, elaboration, evaluation, and extension. The result of research showed that the prospective chemistry teachers' that learning activities based on learning cycle 7E model is effective to be applied which each phase attention to careful time management on the acid-base concept. However, this research did not explore implementation effect size this model in the learning process of acid-base concept.

Keywords: *Learning activities, Learning cycle 7E model, Chemistry teachers' perspective.*

1. INTRODUCTION

Chemistry is the study of the composition and properties of matter and it can explain chemistry phenomena in everyday life [1]. Chemistry is taught at the high school level in Indonesia. However, students consider chemistry is difficult because of its abstract concepts [2], as well as difficulties in understanding the meaning of representations in microscopic and macroscopic terms [3]. As a result, students who study chemistry only as a compulsory subject that must be taken not because chemistry is important to explain phenomena that occur in everyday life [4].

Research by [5] shows that students are do not interested in studying chemistry and tends to use memorization methods without understanding the concept. Another result of the study [6] was the concept that students accepted was memorization because there were indications that students' conceptual learning was not complete. Additionally, research by [7] revealed that if students first understand the basic concepts of chemistry, they can better solve chemistry problems.

The method used in learning is very important and effective for students' conceptual understanding [3]. The learning cycle 7E model is based on a constructivist theory [8]. One of the principles of a constructivist is learning as an interaction between pre-existing knowledge and new knowledge because previous knowledge plays an important role in subsequent learning [9]. In addition, the notion by [8] on the 7E model ensures that prior understanding and transfer to new knowledge are not eliminated. This learning emphasizes that students can construct their understanding, so they are required to be active in the learning process in the classroom. On the other hand, the application of the learning cycle 7E model is still rarely done by teachers, especially in chemistry learning [10].

The results of the study by [2] showed that the use of the case-based learning cycle 7E model compared to the conventional model was better in improving student achievement and attitudes towards chemistry. Furthermore, [11] emphasized that the improvement of students' critical thinking skills was better using the learning cycle 7E model based on local culture in high and low category schools than the discovery learning model. Research by [12] shows that the use of the learning cycle 7E model affects the integrated ability of analytical thinking and science process skills as well as students' creativity in learning chemistry because they learn to find and solve problems.

Acid-base is a fundamental concept in chemistry [13]. The acid-base concept is related to several concepts in chemistry, such as chemical equilibrium [14], redox reactions, solubility, and solution concentration. However, there are still students who have difficulty understanding the concept of acid-base practically [3]. In addition, students experience alternative conceptions [15]. Alternative conceptions that occur are the acid-base theory, acid-base strength, characteristics of acid-base solutions, and acid-base solutions as electrolyte solutions [16]. This study aims to describe the chemistry teacher's perspective on the effectiveness of learning activities based on the learning cycle 7E model.

2. RESEARCH METHODS

2.1. The Research Design

Overall, this study was a qualitative descriptive approach. This was done to determine the effectiveness of learning activities based on the learning cycle 7E model carried out by chemistry teachers in class XI using an open-ended questionnaire. The subjects of this study were 12 chemistry teachers of grade eleven in the city of Yogyakarta. The selection of subjects was carried out by using the purposive sampling technique because they were prepared to be facilitators in carrying out chemistry learning activities in the acid-base concept of grade eleven.

2.2. Data Collection

Data were collected from open-ended questionnaires. It contained 8 question items related to the learning activities carried out. They were categorized into 7 question items about 7 activity phases in the learning cycle 7E model and 1 question item about the effectiveness of the application of the learning cycle 7E model according to the chemistry teacher's perspective on the acid-base concept. The instrument consisted of two columns, the questions and teacher's answers.

2.3. Data Analysis

Data were analysed using open coding. Researchers analysed an open questionnaire by reading and coding all responses word for word individually. The appearance code created a frequency distribution table for phenomena. Furthermore, the frequency of phenomena was changed in percentage form to determine the perspective of the chemistry teacher in class XI on learning activities based on the learning cycle 7E model.

3. RESULTS AND DISCUSSION

The learning cycle 7E model consisted of 7 phases, such as elicit, engage, explore, explain, elaborate, evaluate, and extend. The main focus of the learning cycle 7E model was to highlight the importance of students' initial understanding and transfer concepts to new contexts [8]. The analysis of chemistry teacher perspectives on the effectiveness of learning activities based on the learning cycle 7E model was obtained below.

3.1. Elicit Phase

The elicit phase aimed to identify students' initial knowledge [8]. In the elicit phase, the method was used by all respondents to identify students' initial knowledge was to hold discussions between teachers and students regarding the topic studied. The discussion method is carried out by providing a stimulus to students by providing examples form of relevant phenomena in everyday life (83%) and asking students to open a website address related to the material to be studied (17%) as shown in table 1. In other words, most respondents use chemistry phenomena to identify students' prior knowledge. Previous research by [11] stated that students' initial knowledge can be explored from local cultural phenomena related to the subjects to be studied because their initial knowledge of the subject can help and facilitate in building new knowledge. The use of examples of phenomena in everyday life given in learning materials can help students understand the implementation of chemistry in real life [17], [18].

Table 1. Chemistry teacher's perspective on elicit phase activities

Method	Stimulus	Percentage
Discussion	Examples of relevant chemistry phenomena in everyday life	83%
	Opens website	17%

Relevant topic links from website addresses can help students to expand their knowledge. These findings are consistent with research [18] that the use of websites in learning materials can attract students in learning because they are easy to use whenever and wherever depending on their needs. The use of cartoon concepts, videos, animations, and simple scientific demonstrations can be used to motivate students in the learning cycle 7E model [10].

3.2. Engage Phase

The engage phase aimed to attract attention or arouse students' interest in raising problems [8]. In the engage phase, all respondents stated it was important to make the learning process enjoyable. The implementation of fun learning will provide comfort and pleasure to students so that it will have a positive effect on achieving learning success. Otherwise, unpleasant learning can make students feel saturated thus they did not notice to lessons that can interfere the learning process running well. Therefore, students' perceptions can influence their interest and curiosity in chemistry learning. Previous research has shown that it is important for teachers to be aware of students' perceptions of chemistry because teachers must plan learning strategies to support students for making a good impression to have a positive effect on student interest [19]. Teachers who understand the importance of pleasure learning will stimulate students to get positive emotions in learning so the knowledge learned will be more easily accepted by students to achieve better the learning outcomes [20].

Table 2. Chemistry teacher's perspective on the activity phase engage

Method	Stimulus	Percentage
Discussion	Picture	25%
	Video	42%
Purpose and use of chemistry in life		33%

Based on table 2, the method was used to attract attention or arouse students' interest was 66.67% of respondents giving questions using pictures or videos. Meanwhile, 33.37% of respondents gave the purpose and use of chemistry in everyday life. The findings of this study were inconsistent with previous research by [10] that teachers used simple experiments or inappropriate occasions to attract students' attention, for them to ask questions. This was supported by [21] that teachers still have difficulty experimenting to practice in class and difficulties in developing scenarios to relate the real-life topics. However, the method respondents use made students directly involved in providing learning experiences while fostering student curiosity. Of course, the learning process will be attractive. Characteristics of enjoyable learning by [20] is that students are deeply involved in tasks or experiences by cultivating curiosity.

3.3. Explore Phase

The explore phase provided opportunities for students to observe, record data, identify variables, design and plan experiments, make graphs, interpret results, make hypotheses, and make conclusions [8]. This activity can be guided using student worksheets [10]. Based on figure 1, the method used in the explore phase was 75% of respondents asking students to find solutions for their problems given through various sources by discussing with other friends and conducting simple experiments to differentiate acid-base solutions guided by student worksheets. Meanwhile, the lecture method was used by 17% of respondents and 8% used the mind map method.

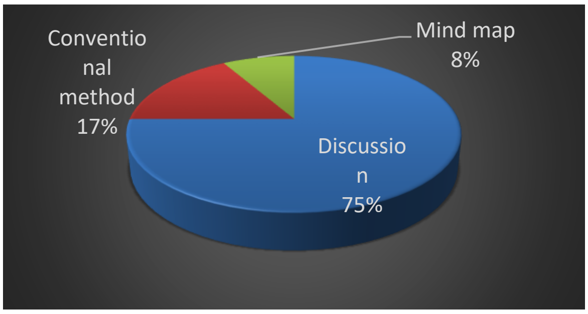

Figure 1 Chemistry teacher's perspective on the explore phase activities.

In this phase, there were still respondents who used the conventional method to build concepts, so that the learning process was dominated by the teacher. As a result, students in the class become passive because they were not allowed to be involved in the learning process. This was consistent with research by [22] that students who constructed their own concepts will experience an increase in cognitive structure because they were allowed to actively seek knowledge so their chemistry learning high in attention. Therefore, passive students will be less focused on the course of the learning process. Students who were passive in class will be one of the obstacles in implementing the learning cycle 7E model because they don't tend to be ready for learning [11].

3.4. Explain Phase

The explain phase aimed to explain the concept and summarize the results found in the explore phase [11]. The teacher's role was to guide students towards coherent and consistent generalizations [8]. All respondents used the discussion method by asking student representatives to present their search results. Furthermore, respondents provided topics reinforcement with the conventional method to explain theories, principles, laws, and facts. This was consistent with research [10] that the explain phase can be assisted by video-films, concept maps or presentations, and direct instruction.

The explain phase gave the teacher an important role in creating teacher-student interactions because it can influence students' feelings. Teachers who clearly provide explanations, provide feedback on assignments and assessment materials, and encourage collaboration among students will produce a positive perception of students towards chemistry. It is following research [23] that teacher-student interaction, guiding, and providing feedback at the right time and encouragement to learn will positively affect student development.

3.5. Elaborate Phase

In the elaborate phase, students were allowed to apply the new knowledge they have acquired [8]. The method used by all respondents in this phase was to provide students with new practice questions to solve. In other words, this phase can generate new problems for further investigation. Cultivate students' habit of solving problems so that they better understand the topic being studied. According to research by [20] that habituation is a learning method. This means that students who were used to solve problems will improve their problem-solving abilities.

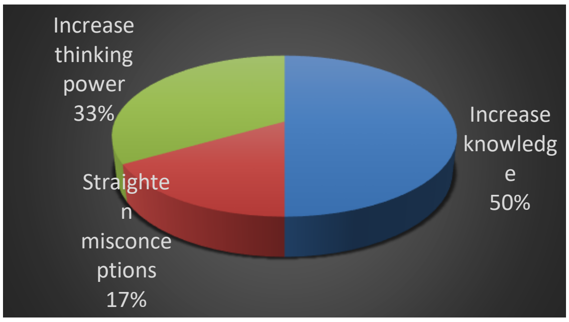

Figure 2 Chemistry teacher's perspective on elaboration phase activities.

Based on Figure 2, the elaborate phase was carried out to increase the knowledge that students have acquired during the learning process (50%), straighten the knowledge they have acquired in case of misconceptions (33%), and increase students' thinking power (17%). According to a study by [3] that the learning cycle 7E model which was based on a constructivist learning strategy was suggested for conceptual understanding and preventing student misconceptions. Besides, the learning cycle 7E model was effective in encouraging students' thinking skills to improve conceptual understanding [2] and help students use their creativity to solve problems [12].

3.6. Evaluate Phase

The evaluation phase focused on providing a formative evaluation of the development of students' knowledge of concepts, principles, and the ability to apply concepts [11]. Formative evaluation can also be cleared with summative evaluation simultaneously [10]. All respondents conducted written evaluations in the form of quizzes (50%) and orally (50%) during the learning process. This was completed by respondents to find out the extent of the students' understanding. The findings of this study were consistent with the notion [8] that formative evaluation should not be limited to a particular phase of the cycle but during all interactions with students.

Learning interaction was one of the actions and reactions between students, student-learning resources, and student-teachers. Chemistry learning interactions in this phase focused on teacher and student activities concerning evaluation. Evaluation can be carried out by the teacher when holding questions and answers during the learning process, allowing students to ask questions, and before the lesson ended the teacher was giving questions related to the material that has been learned [24].

3.7. Extend Phase

In the extended phase, students were encouraged to connect and apply the concepts learned in everyday life [11]. All respondents in this phase provided discourses and problems to students related to chemistry phenomena in everyday life.

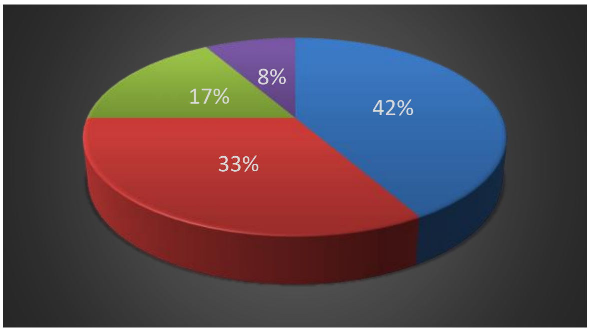

Figure 3 The chemistry teacher's perspective on the extend phase activity.

Based on Figure 3, respondents carried out the extend phase so there was meaningful learning (42%), learning was more interesting (33%), students were able to solve problems related to chemistry phenomena in daily life (17%), and students knew the relevance of the material being studied with daily life (8%). Moreover, teachers for students need to practice the knowledge transfer in everyday life. This was related with research [8] that the learning cycle 7E model emphasized the knowledge transfer importance.

The importance of linking the concepts learned by students with their implementation in everyday life has become the goal of science knowledge recently [11], [25], [26], [27]. This teaching strategy effected students knowing the relationship between concepts and their implementation in everyday life. Students realized the concepts that have been learned were useful for their lives. On the other hand, this strategy was considered appropriate for the heterogeneous cognitive development of students in schools [27].

3.8. Chemistry Teacher Perspective toward Learning Cycle 7E Model

Based on the results of the analysis, 50% of respondents did see the learning cycle 7E model and 50% of other respondents did not see this learning model because it was not familiar. Research by [2] found another fact from the effectiveness of the learning cycle 7E model that this model was foreign to teachers. For respondents who did not notice this model, the researcher explained what was in the 7E model learning cycle first to the respondent. Furthermore, respondents said that they have implemented the phases in the 7E model learning cycle during the learning process because it was related to the scientific approach in the 2013 curriculum. This is supported by [28] that the effective learning model was corresponded by the 2013 curriculum that applied a scientific approach is a learning model cycle 7E.

The learning cycle 7E model was effectively used during the acid base learning process for 50% of respondents. Besides that, 25% of other respondents stated that it was effective if these phases were not carried out in one teaching and learning activity (2 x 45 minutes). These results were correlated to the previous studies by [2], [21] that one of the obstacles to implementing the learning cycle 7E model required more time in learning activities. This fact shows that there was a need for careful organization of time and each phase. Also, a positive view of the effect of the learning cycle 7E model activities was that students will relate their knowledge to real-life and guide students in inquiry learning [21]. Another study by [29] stated that the learning cycle model has a strong effect on the success rate of students' science learning.

4. CONCLUSION

Based on results and discussion, it can be concluded that in general the prospective chemistry teachers' that learning activities based on the learning cycle 7E model is effective to be applied, especially on the acid-base concept. This indicates that the learning cycle 7E model is still a need for further development to explore implementation effect size and this model in the learning process of acid-base concept. Although the number of participant teachers in this study is limited, the study seems to help with closing the gap between chemistry teachers' experiences and their view about developing activities based on the learning cycle 7E model.

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