The Effectiveness of ALBICI Model in Diagnosing K-11 Students’ Conceptions on Debit Concept

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Abstract. The aim of this study was to knowing the effectiveness of ALBICI Model for students’ conception on a debit concept. ALBICI or Active Learning Based-Interactive Conceptual Instruction is one of more learning model which can improve understanding of the concept of students. The ALBICI model consists of four phases; 1) Conceptual focus 2) Use of the text 3) Research-based materials 4) Classroom interactions. This study used a quantitative method with pretest-posttest control group design. In this study followed by 28 students in one of senior high school in Bandung City. The effectiveness of ALBICI model was evaluated by fluid dynamic diagnostic test sub-concept debit with four tier test which number three questions. The result shows that the implementation of ALBICI Model is able to change students’ conception on the Debit concept. The enhancement of students’ conception is shown by the percentage of Understanding as 0.32%, the decreasement shown by the percentage of Partial Understanding as -0.28%, and the Un-Code category in the percentage -0.04%, and also the student that had no change of their conceptions is shown by the students that still has misconception and not understanding.

1. Introduction
Changes in Indonesia's latest curriculum requires learning activities in the classroom to student-centered. In the previous curriculum, classroom learning is done by teacher centered and makes students passive with only hear and understand what is conveyed by the teacher. Teacher-centered learning makes the learning process is not clear enough in communicating the learning structure or settings that affect the interpretation of changes in students due to lack of engaging students in learning activities [1]. Teacher-centered learning usually uses the traditional learning model, for example, the learning method is less precise lecture used in scientific learning activities that are scientific concepts to understand the students [2,3,4]. Therefore, teachers need instructional strategies that engage students in learning activities, one of them by applying active learning model is a model of Learning-Based Active Learning Conceptual Interactive Instruction or ALBICI.

Learning model ALBICI used in this study is very useful to enhance the students' understanding of the concept because of the stages or phases of this learning model support in improving student understanding [5]. As for the phases of this model are 1) conceptual focus (video in everyday phenomena related to the concept of learning materials), 2) use of texts (students are given the instructional materials and understand), 3) research-based materials (students conduct experiments directly with the teacher's guidance), 4) classroom interactions (students in groups to show the results of experiments to be discussed in class). All these phases can involve active student learning so that they can develop their
potentials in improving the understanding of the concept. It is important for teachers to improve classroom learning system in order to understand whether or not the student is identified to a material or concept.

These problems arise because when students come to class with the understanding that he had based his experience everyday so-called pre-conceptions or preliminary understanding, not in accordance with expert opinion that appeared diverse conceptions of the students [6,7,8]. Category conception in this study refers to the conception of the research category Samsudin, et al (2016) [5]. Category conceptions of students identified with the students’ answers to the question of dynamic fluid diagnostic sub-concepts Debit in the form of four-tier. The debit equation as a material limitation in this study as follows.

\[ Q = \frac{V}{t} \]  

(1)

2. Research methodology

The method used in this study is a pre-experimental research and one group pre-test post-test as the research design. This study conducted to 28 students as research sample in one of the senior high school in Bandung City. Before the study began, the students were given a pre-test at the beginning of the meeting to be given a question diagnostic test of dynamic fluid about debit sub-concepts in the form of four-tier test to know the initial understanding of the students. After learning that students were given treatment using ALBIC learning model that has stages or phases that can enhance students' understanding. Then in the final phase of post-test students were given the same questions compared the results with a pre-test. The research design is present in figure 1 as follow.

![Figure 1. One Group Pretest-Posttest Research Design](image)

The diagnostic test of dynamic fluid about debit sub-concept shaped four tier test consisting the first tier is question multiple choice about debit concept’s, second tier is level of sureness for answer question multiple choice at first tier, third tier is reasons for answer question multiple choice at first tier and fourth tier is level of sureness on answer reasons the third tier. Questions are given to students in pre-test and post-test. The example from the diagnostic test of dynamic fluid about debit sub-concept shown by figure 2.

2.1 Diya and her friends did an experiment on the water discharge. The experiment on four identical tubular vessel filled by the water with different volumes at each pitcher and had a hole in the bottom side of the vessel, so the water gushing out of the hole (holes are on the air pressure and the same depth). Water in the fourth vessel discharged in a different time. If \( t_1, t_2, t_3 \) and \( t_4 \) is a time sequence vessel 1, 2, 3 and 4 for emptying the water in the vessel, the vessel which has the largest volume of water is?

A. Vessel 1.  
B. Vessel 2.  
C. Vessel 3.  
D. Vessel 4.  
E. All vessels have the same hole.

2.2 The level of sureness in the choice of answers 2.1

1. Sure  
2. Not Sure

2.3 Reasons for the choice answer on 2.1

A. The large volume of water in a vessel will have a large discharge, so that a longer time interval.  
B. The little volume of water in a vessel will have a large discharge, so that a shorter time interval.  
C. The large volume of water in a vessel will have a large discharge, so that a shorter time interval.  
D. The little volume of water in a vessel will have a small discharge, so that a longer time interval.  
E. .................................................................................................................................

2.4 The level of sureness in the choice of answers 2.3

1. sure  
2. Not Sure

![Figure 2. Example of Diagnostic Fluid Dynamics Test on Sub-Concept Debit](image)
The data obtained in this study is a form of quantitative data generated from the pre-test and post-test diagnostic test item dynamic fluid about debit sub-concepts identified by category referred to students conceptions of research Samsudin, et al (2016) [5]. Some categories of students’ conceptions shown by table 1.

### Table 1. Students’ Conception Category

| Number | Category          | Option | Sureness Level | Reason | Sureness Level |
|--------|-------------------|--------|----------------|--------|----------------|
| 1      | Misconception (M) | false  | sure           | false  | sure           |
| 2      | No Understanding  | false  | sure           | false  | unsure         |
| 3      | (NU)              | false  | unsure         | false  | sure           |
| 4      |                   | false  | unsure         | false  | unsure         |
| 5      | Sound Understanding (SU) | true | sure | true | sure |
| 6      | Partial Understanding (PU) | true | sure | true | unsure |
| 7      |                   | true   | unsure         | true   | sure           |
| 8      |                   | true   | unsure         | true   | unsure         |
| 9      |                   | true   | sure           | false  | unsure         |
| 10     |                   | true   | sure           | false  | unsure         |
| 11     |                   | true   | unsure         | false  | sure           |
| 12     |                   | true   | unsure         | false  | unsure         |
| 13     |                   | false  | sure           | true   | sure           |
| 14     |                   | false  | sure           | true   | unsure         |
| 15     |                   | false  | unsure         | true   | sure           |
| 16     |                   | false  | unsure         | true   | sure           |
| 17     | No Coding (NC)    |        |                |        |                |

Samsudin, dkk (2016)

### 3. Result and discussion

Based on the data processing that has been performed on the data pre-test and post-test, produced some categories of students are shown in Table 2 below.

### Table 2. Data’s Students’ Conception Category

| Concept | Question Number | SU | Post- | MC | Post- | NU | Post- | NC | Post- |
|---------|-----------------|----|-------|----|-------|----|-------|----|-------|
| Debit   |                 |    |       |    |       |    |       |    |       |
| 1 1     | S1,S4, S13,S1 | Pre- | Post- | Pre- | Post- | Pre- | Post- | Pre- | Post- |
| 2       | 6,19           | (5) | (10)  | (2) | (2)   | (2) | (0)   | (0) | (0)   |
| 3       | S1,S5, S11,S1 | 2,15, S15, S17,S1 | (2) | (2)   | (2) | (0)   | (0) | (0)   |
| 4       | S1,S6, S7,S10 | S1,S14, | S13,S1 |     |       |    |       |    |       |
| 5       | S1,S8, S9,S10 | S2,S20, | S18,S2 |     |       |    |       |    |       |
| 6       | S1,S12, S14,S12 | S2,S23, | S25,S2 |     |       |    |       |    |       |
| 7       | S1,S15, S17,S15 | S2,S26, | S27,S2 |     |       |    |       |    |       |
From table 2 it is shown that after applying the learning model ALBICI students has increased from pre-test to post-test in the category of conception SU (Sound Understanding) and decreased in the category of conception PU (Partial Understanding) and NC (No Coding), even their conception category is fixed or not there is a change that is in the category of concept MC (misconception) and NU (No Understanding). Shown in Table 2 increase in the category of conception SU more experienced students in question number 1 as many as 5 more increased than when the pre-test, and an increase also occurred in the conception category NU conception. However, most students experiencing conception category PU in pre-test, while no change in category MC and NC, as well as about the number 2, only the conception category NC decline. As for the number 3 students increased in the category of conception SU and PU from pre-test to post-test, MC and NC conception category unchanged as well as the category NU decreased conception. It shows that the application of the learning model ALBICI able to increase the students' understanding. It proved by learning model ALBICI has four phases or phases, namely 1) Conceptual focus, the conceptual focus is the first stage of the learning model ALBICI that includes the conceptual explanation and does not involve mathematical explanations or only slightly offend the mathematical equations of a concept. In this first stage the teacher presents or shows the phenomenon to be the object of observation and discussion that serves as an introduction that teachers use in instilling new concepts with the old concept that students have. 2) Use of text, is the second stage of the learning model ALBICI. At this stage, students are given teaching materials that have been prepared by educators and are welcome to read and understand the teaching materials, then create a concept map based on their understanding. Students are given instructional materials to avoid writing when the lesson takes place unless it is only an important note or marks an important part of the resource. 3) Research-Based Materials, is the third stage of the learning model ALBICI. This stage is a
stage that has a function to improve students' conceptual understanding and overcome the difficulties of students in learning the concept by doing the conceptual question and answer exercises developed by the teacher to obtain feedback that shows the constant development of students' conceptual understanding or students in groups are given problems based on experiments on Student worksheet. 4) Classroom interactions the fourth stage of the Learning Model ALBICI. At this stage all students conduct an overall discussion related to the material delivered with guidance and explanation of educators to straighten the concepts that students have in order to avoid mistakes or misconceptions. The advantages in using learning model ALBICI is to have the syntax or learning stages such as the above explanation in improving students' understanding because the learning process involves students directly. This is evidenced by the figure 3.

![Figure 3. Grafik Percentage of Students’ Conception](image)

Based on figures 3 and percentage differences in Table 2, it appears that the conception of SU student category increased by 0.32% and a decrease in conception PU category of -0.28 and -0.04 for NC conception category, as well as the unchanged the conception of the MC and NU category of pre-test to post-test. Results have been obtained proving that ALBICI effective application of learning models to identify students' conceptions category.

4. Conclusion
Understanding the student's concept of a learning material is very important. Therefore, a teacher should be able to make students understand the concept of a subject, one of them by using the model of learning applied in the process of learning in the classroom. Implementation of learning models ALBICI is one of the learning model that has several stages that can be used to improve student conception on Debit concept. The increase in student conception is indicated by the percentage of Understanding of 0.32%, the decrease indicated by the percentage of Partial Understanding of -0.28%, and the Un-Code category in the percentage of -0.04%, as well as the students who did not undergo a change of their conception shown by students who still have misunderstandings and do not understand.

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