Analysis of students interaction on technology based Conceptual Change Text (CCT) in physics classroom

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Abstract. This study aimed to analysis the interaction of student-students, students-teacher, students-material and students-learning media on Technology Based Conceptual Change Text in physics classroom. The analysis based on the frequent students interaction and was supplemented by qualitative (descriptive) data. Observation sheet was used to collected data of student-students interaction, student-teacher and student-learning media interaction. In addition, the research used student’s worksheet to collect data of student with material interaction. The finding show that there was improvement of the frequent students interaction from the first cycle to third cycle. These finding indicated that use of Technology Based Conceptual Change Text Approach in physics classroom allows for adequate students interaction with material, learning media and with other students. The result of this study can serve as reference for future studies on students interaction in physics classroom, especially using Technology Based Conceptual Change Text.

1. Introduction
The quality of student’s learning outcome is determined by various factors. The selection of learning approach in learning process are very important factor to ensure student’s understanding of concept. Learning approach is method including sequences that design how student’s activities during learning process. Student’s activities especially students interaction with peer students, students-teacher interaction, students-material, students-instructional media interaction make the strong contribution to learning outcome and satisfaction.

Actually in physics classroom at Laboratory Secondary Senior High School UPI, there was just less than fifty percent of number students who got score more than minimum completeness score (KKM). Exactly the reasons of why student’s learning outcome was not inline with expectation was because of students interaction in learning process was less meaningful. In addition, kind of students interaction more happening between students and teacher but less for other interaction. Whereas good interaction such as students with peer students, students-material, students-learning media and also students-teacher interaction will create positive relationship and contribute to improve learning outcome. According to the Pianta’s research [1] that an increasingly robust science of classroom processes identifies teacher–student interactions as a key asset for improving student learning and development.
[1]. From the other research showed that a significantly positive relationship exists between interaction pattern and students’ post-learning attitude and low academic task achievement [2].

Furthermore, the interaction students with material and learning media, students have no desire to learn by their self using the material and learning media without teacher explanation. This problem is general problem in the country. student interest in reading text is still low category. students are more interested in playing digital technologies such as cellular phones rather than reading books instead. The results of this observation are consistent with the results of research conducted by the 2012 OECD- (Organization for Economic Cooperation and Development) in the Program for International Student Assessment (PISA) on reading comprehension of students at the secondary school level (aged 15 years) that Indonesia ranked 64th of the 65 participants who participated. Even though learning physics requires students' interest and skills in reading.

Based on this problem, technology based conceptual change text was used in this research. Conceptual Change Text (CCT) is one of the concept change approach strategies that emphasizes students as centre of learning. Some research results showed the relationship between CCT and students’ understanding. Chambers and Andre’s [3] research which showed that Conceptual Change Text was more effective than plain text in the conceptual understanding of electrical circuits. Moreover Ozkan and Selcuk [4] also conducted research on the effect of technology-enhance CCT on students’ understanding of the concept of buoyancy in elementary school. The results of Ozkan and Selcuk’s [5] study found that students’ understanding of the buoyancy using technology-enhance CCT was higher than that of students who used plain text.

Conceptual change approach has been developed by Posner is based on 4 conditions as follows [3] dissatisfaction, intelligibility, plausibility, and fruitfulness. Dissatisfaction is where students should feel unsatisfied with the concept that they have. Thus, they will realize that it does not enough for them to solve problems that they face. Therefore, they need a new concept to change their dissatisfaction. Intelligibility is where students need to understand the new concept that they get well. It should be presented clearly, and simply. It also need to be relevant with the previous concept so they will be easier to understand it. Besides, the media such as table, diagram, and others can be used to make it clearer. Plausibility is where students need to find the logic from a new concept that they get. Besides they need to be able to imagine it by making a schema on their mind. In other words, it should be reasonable, acceptable, and coherence and appropriate with the previous concept that they have. Ruitfulness is where A new concept need to be able to solve problems faced by students. Besides, it also need to be able to make students do some researches or find something new. One of ways to fulfill this needs is to complete the information about how to make the new concept meaningful in daily life.

Bloomenfed et al [4] argued that technology in the learning process can improve student’s interest and motivation to involve during lesson, provide access to information, enable meaningful learning, structuring learning processes with strategies, analyzing and correction misunderstanding and manage the complexity.

According to the results of the study [5] concluded that CCTs accompanied instruction can be useful or effective in remediation of students’ misconception but should be supported by other materials or experiences to increase their effectiveness. The effects of conceptual change texts supported instruction on achievement and attitudes may change according to learning styles, learning approaches, thinking styles, motivation, reading comprehension and multiple intelligence.

Technology based Conceptual change text has the opportunity to enhance student interaction both interaction with peer students, teachers, material and learning media. Instead of finding student learning outcomes, this study chose to analyze student interactions including student-peer interaction, student-teacher interaction, student-material interaction and student-instructional media interactions. This analysis is important to know how the quality of the learning process.
2. Methods
This research was a classroom action research consisting of three cycles. From each cycle there are several processes that outline were plan, implementation, evaluation and reflection. The results of the first cycle will be used as a reference to determine the next cycle of action. The research steps was illustrated by Figure 1.

In the first cycle, there were four basic concept which is have to learn by students in this study. There were charge interaction, electric force, electric field for point charge and electric potential for point charge. Furthermore for the second cycle, the basic concept were flux, Gaus’s law, sphere conductor, plat conductor. And for the third cycle were electric field of conductor plate, potensial and potential energy, capacitance of capacitor and capacitor circuit. 35 secondary senior high school students from one class of a Laboratory Senior High School UPI participated to the study.

The data was collected by sheet observation to get students’ interaction with peer other students, students’ interaction with teacher and students’ interaction with learning media. And for students’ interaction with material, students’ answer on the worksheet was used to get the data. Students’ worksheet was the one of material in these learning process. Some scientific activities that could be analyzed in the material were: observing the phenomena, predicting, collecting data, concluding, problem solving, and presenting

3. Results and Discussion
The result of this study could be figured by figure 2. The data showed the mean frequent for each interaction.

![Figure 1. The research steps.](image)

![Figure 2. The mean frequent for each interaction.](image)
Based on the data, we could see that mean frequent of student’s interaction with material in the first cycle was 3, and in the second cycle was 2.8 and in the third cycle was 4.3. There was a bit decreased from the first to the second cycle because of the material in the second cycle more open instruction than in the first cycle, but in the next cycle (3rd cycle), student’s more confident when doing interaction with material because they have experiences. In addition, the basic concept in the second cycle was more complicated for students than basic concept int the first cycle. Furthermore, the frequent of students’ interaction with material could be showed by figure 3.

![Interaction Frequent](image)

**Figure 3.** The frequent students’ interaction with material.

From the data, we can see that the highest interaction was in the first cycle for charges concept and the lowest interaction was in the second cycle for the Gaus’s Law. We argued that this happen because of the charge concept is the most simple concept and the Gaus’s law is the most complex concept. Based on this argue, we consider that material should be revised. Gauss law is the new concept for students that need some prior knowledge and math ability. If students did not know yet about integral concept in math then they will have difficulties to learn about Gauss law.

But generally, students interaction with material is good interaction which is students could study by their self. Students more active to finish worksheet. Students could solve the problem in the worksheet in the third cycle. Students could do activities in the third cycle by using worksheet as material learning. Hence, we can said that there was improvement of student’s interaction with material.

Moreover students interaction with learning media decrease from the first cycle 2.8, the second cycle 2 to the third cycle 1.8. In the first cycle, we used simple animation (based java) to show the concept about interaction of charges. When students used this media, students did not need special skill or knowledge. So easy for students to explore the media. In the second cycle, we used java animation and wolfram. Students have a problem when learning using wolfram. And in the third cycle, students have difficulties to analyze charge on the conductor plate using video. The video using English but many students did not understand completely about English. This problem made decreasing of interaction. But over all, there still were good students interaction with the learning media along study.

The other grateful from the result was students’ interaction with other peer students. Usually students’ interaction with others when they are doing other things but are not doing much in learning. But in this study, we could see that the students’ interaction with others was increasing from the first cycle to third cycle. The technology based conceptual change text allows students’ interaction when
they are doing learning and facilitate students to discuss the topic of learning. Most often students discussed to solve the problem during learning process using technology based conceptual change text.

4. Conclusion
Based on the data, in learning process of static electricity using Technology Based Contextual Changes Texts mostly often occur interaction between students and teachers, peer students, materials and learning media.

Based on the frequent of mean number, the most often student’s interaction was student interaction with peer other students 3.41, 3, in third cycle, 4.8 times for mean frequent. And the least frequent student interaction was student’s interaction with learning media 2.8, 2, in second cycle, 1.8 times for the mean frequent.

The data also showed that students’ interaction between students with peer students and between students with teaching materials increased from the first cycle to third cycle.

The finding shows that there was increasing of the frequent number students’ interaction especially for students’ interaction between students with material and with peer other students from the first cycle to third cycle. These finding indicated that use of Technology Based Conceptual Change Text Approach in physics classroom allows for adequate student’s interaction. The result of this study can serve as reference for future studies on students’ interaction in physics classroom, especially using Technology Based Conceptual Change Text

5. References
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