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Improving student collaboration and critical thinking skills through ASICC model learning

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Abstract. Previous study at three leading high school in East Java have revealed that student's higher order thinking skills are good but their collaboration skills are still low. This study was aimed to reveal the effect of implementation the ASICC problem-based learning model on student's critical thinking and collaboration skills. The study included quasi-experimental research with a non-equivalent pre-post test control group design in second grade students in three leading high school in East Java. All instruments used are valid and reliable. Collaboration data that were normally and homogeneous were analyzed by t-test. The correlation between collaboration skills with critical thinking was analyzed with Pearson's correlation. This study revealed that there were significant differences in student's collaboration scores in the experimental and control classes. The ASICC class collaboration score is higher than the control class. There was a positive correlation between the ability of collaboration with critical thinking ($r = 0.78$). The ASICC learning model can be used as one of promising learning model to improve student collaboration skills and maintain critical thinking skills.

1. Introduction

Today, one of the challenges of learning is how to improve 21st century skills not only for students who have low academic abilities but also students with high academic abilities. Generally, students of high academic ability have critical and creative thinking skills. However, their collaboration skills were low. This is in line with preliminary research findings that students of high academic ability in three schools in East Java have high critical thinking skills but their collaboration skills were still low. Based on observations at the school, students were able to work on higher order thinking task by individually.

On the other hand, critical thinking and collaboration skills are skills needed by everyone in the 21st century [1,2,3,4]. Critical thinking skills have an important role so that someone was able to respond to problems and solve the problems [4]. Collaborative skills is also very necessary so that someone can solve problems more effectively and efficiently. Collaborative skills are also needed so that someone also has tolerance, responsibility, respect and wise to face the complexity of problems. Critical thinking and collaboration skills involve mental processes of induction, deduction, classification, and reasoning [3,5,6]. These skills are also demands of future competencies that need to be immediately empowered to students through learning [7]. This causes critical thinking and



collaboration skills cannot grow instantly [9]. But it requires process and time. Empowerment of 21st century skills must be integrated in learning [1,9,11]. Including critical thinking and collaboration skills.

Based on a description of conditions in school and critical thinking and collaboration skills, this study aims to reveal the effect of applying the ASICC learning model on critical thinking skills and collaboration skills. Especially for students with high academic ability. The ASICC learning model has been developed to empower higher-order thinking skills, argumentation, and collaboration [10]. The ASICC learning model was constructed based on constructivist learning concepts and zone proximal development (ZPD) [10]. The study of the impact of applying the ASICC learning model on critical thinking skills and collaboration on students with low academic abilities has never been revealed.

2. Methods

This research was conducted with quasi-experimental method using nonrandomized control group pretest-posttest design in a leading senior high schools in East Java (SMAN Brawijaya Kediri), XI-MIA 6 as control class and XI-MIA 8 as experimental class (using ASICC model learning). Both of classes consists of higher academic background. This claim was supported by standard academic test in previous study. The research instrument consists of critical thinking skills, collaboration skills, and teaching materials were validated. Data critical thinking skill was collected using rubric of critical thinking skills assessment integrated on cognitive tests from Zubaidah [11]. Data collaboration skill was collected using Work Group Based Collaboration Skills Assessment (CSA) was developed before [10]. Both of critical thinking and collaboration skills were measured both before and after learning. Anacova analysis was used to determine the effect of covariance. In this study the data obtained are homogeneous and normal and there was no covariant effect so that the analysis of the average difference between the control class and the experiment is carried out with the *T*-Test. A simple correlation test was conducted to reveal the relationship between critical thinking skills and collaboration.

3. Result and Discussion

Based on Table 1, the scores of students critical thinking skills between control class and the experiment both of the pre and post tests were included in good categories. This research also was obtained that there was an increase in the scores of students critical thinking skills between control and experimental classes but that increasing included in the low category. Both of the pre test of students' collaboration skills in control and experimental classes was low. But the post test score of students collaboration skills has increased so that the post test of students' collaboration skills including good categories.

Anacova analysis revealed that covariance had no effect on post test scores. Based on Table 2, there was no differences in students critical thinking skills between control and experimental class. This was indicated by the results of the free *t* test up to 0.22 or more than 0.05. This condition was different from the aspects of students collaboration skills. Based on Table 1, there was a significant differences the students collaboration skills scores between the control and experiment class. The average score of the students collaboration skills of the experimental class students (48.96) is higher than the control class (32.17). Based on the results of data analysis in this study, it was found that the application of the ASICC learning model to students with high academic ability was able to maintain critical thinking skills and was able to significantly enhance students' collaboration skills. This reveals that the ASICC learning model can be used to enhance the students collaboration skills while maintaining students critical thinking skills. The implication of this study for teachers is the ASICC learning model can be applied to students with high academic abilities. The goal is to improve both of the students collaboration skills and maintain students critical thinking skills.

The ASICC learning model consists of stages: Adapting, Searching, Interpreting, Creating and Communicating [10]. The initial stage of the student activities was guided to reflect on themselves to

be able to find effective and efficient learning strategies. At the adapting stage, students were asked to understand the learning objectives, academic abilities, and learning styles. In the searching stage, students were guided to gather the key informations both of by individually and by groups. In the interpreting stage, students were guided to work together in small groups. One group consists of four students. Their task were to complete the jumping by answering higher order thinking questions. In the next stage, students were guided to prepare reports and mind maps. So, the ASICC learning model guides students to be able to reflect on themselves to achieve learning goals, gather key information, solve contextual problems, share their idea, and produce specific products.

Based on the description of the ASICC learning model, student learning activities were directed not only to be able to think at a higher order thinking through problem solving. However, students are also directed to be able to solve problems in groups. This revealed that the ASICC learning model guides students to learn in a group in a structured and organized manner. Collaboration skills is one of the life skills needed in the 21st century [4,5,7]. Collaboration skills are closely related to motivational processes, task sharing, understanding of group vision, targets, and self-evaluation [3,8]. This shows that collaboration skills required time in process and stages [4,6]. These skills cannot emerge suddenly, must be programmed, structured, and organized [10]. Learning that aims to improve student collaboration skills must also be designed in a structured and organized manner. So that students' collaboration skills can be improved.

Table 1. Score pre and posttest of the student critical thinking and collaboration skills.

Class	Score Critical Thinking		N-Gain	Score Colaboration		N-Gain
	Pre	Post		Pre	Post	
Control	75.21 ± 2.05*	76.82 ± 0.96*	Low	26.44 ± 2.23**	32.17 ± 0.14*	High
ASICC	76.84 ± 1.67*	77.09 ± 1.88*	Low	25.06 ± 1.47**	48.96 ± 0.23*	High

*) good category, **) low category

Table 2. Results of t-Test and correlation between critical thinking with collaboration skills (r = Pearson Correlation)

Class	N	Mean		r (0.01)
		Critical Thinking	Collaboration	
Control	36	76.82 ± 0.96	32.17 ± 0.14	0.78
ASICC	36	77.09 ± 1.88	48.96 ± 0.23	0.80
Sig. (0.05)	-	0.22	0.00	

4. Conclusion

The ASICC learning model can be used not only to maintenance of students scritical thinking and also to improve the collaboration skillsto the student with high academic ability. There was a strong and positive correlation between critical thinking skills and student collaboration skills.

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