Implementation analysis of formative self and peer assessment towards critical thinking skill in junior high school

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Abstract. The change of assessment paradigm from assessment of learning to assessment for learning is an effort to implement formative assessment. Implementation of assessment for learning involves the students to understand and be responsible for their ability, while the teacher acts as their partner that directs the learning process which is integrated with assessment. The formative self and peer assessment provides feedback to direct students to do self-regulation and think critically. This study explains that the implementation of formative self and peer assessment has not been optimal so that the results of self-assessment tests of junior high students on critical thinking skills in the average category. Implementation of school learning is based on scientific approach but formative assessment has not been integrated. The critical thinking skills of the students are only supported from the learning process only without scaffolding. Interviews were also conducted with four science teachers indicating that this school has developed a website in the implementation of cognitive and formative assessment, but there is no optimization of the system in it merely to transfer paper media to the website. The availability of media can be an opportunity to present formative self and peer assessment in this school.

1. Introduction
Assessment has an important role in the learning process. The role lies in the motivation of students and teachers to evaluate themselves. The role of assessment for students is that they can measure learning ability. The role of assessment for teachers is that they can evaluate how to teach and master material content. As the times change, the role of education now requires a process assessment using self-assessment methods using self and peer assessment [1]. Process assessment is needed because the Indonesian curriculum focuses on the student center according to 21st century skills characteristics. New assessments need to be implemented and based on the responsibilities of teachers and students as fellow learners. Students should have a deeper sense of responsibility towards developing abilities and not just thinking of getting value. So, a new assessment needs to be applied for education now.

The new assessment is a paradigm shift in the assessment approach. Assessment is divided into three ways based on their relationship with learning that is assessment of learning, assessment for learning and assessment as learning [2]. Assessment of learning is the approach taken during this example to give the test at the end of the material. This assessment will not lead students to become independent and enduring learners. The change of assessment paradigm from ‘of learning’ to ‘for learning’ is needed to compensate for the development of the 21st century. Formative assessment is an assessment that can assess process skills. Formative assessment is a process not a tool [3]. Formative assessment is an
integral part of the learning process and directs students to take an active role by taking on the role of the assessor and the judged [4].

Formative assessment has benefits for students by examining and giving comments on self-work (self assessment) and their friends (peer assessment). Self assessment can be defined as a cycle consisting of several stages of determining assessment criteria, directing itself to the search for feedback, self-reflection, and self-assessment considerations [5]. Peer assessment describes cycles consisting of stages of task involvement, peer analysis, feedback provisions, acceptance of feedback, and task revisions [5].

The most important part of self and peer assessment is feedback. Providing feedback leads to deeper analysis and improves knowledge and skills [4]. Skills that can develop one of them is critical thinking skills. Several previous studies have found that peer ratings can help students develop or encourage essential learning and life skills such as high-level thinking, motivation and responsibility [4]. Peer assessment can improve critical thinking skills, self efficacy, metacognition and learning objectives [6]. Thus, formative self and peer assessment can improve critical thinking skills based on some previous research.

2. Method
This preliminary study analyzed the implementation of formative assessment with self and peer assessment method and critical thinking skill profile at SMP Alfa Centauri in Bandung City. This study was conducted using survey method with observation method, questionnaire and interview. The sample consists of students of grade 8 and 4 science teachers in the school. The urgency of this study is to analyze the implementation of assessment for learning to prepare life long learner in 21st century. The instrument used is open questionnaire for teacher, self assessment questionnaire of critical thinking skill for student, and structured interview sheet. The focus of the study those are first is the implementation of the formative self and peer assessment of science learning, second is the profiles of students' critical thinking skills, and the third is the relationships and roles between formative self and peer assessment with critical thinking skills.

3. Result and Discussion
Discussion of this study is divided into three sections consisting of first is the implementation of formative assessment in the school, second is the profile of students' critical thinking skills and the third is relationships between formative assessment and critical thinking skills. Data analysis using descriptive statistics is presented in graphical form.

Implementation of the assessment in this school has been assisted ICT (Information and Communication Technologies). ICT used in the form of school website development for academic purposes including evaluation. Implementation of evaluation such as UTS (midterm exam) and UAS (final exam of semester). Three forms of evaluation are summative assessments presented in the form of multiple options equipped with image and video features. In addition, the correction and presentation of the results of the item analysis is also done by the system. While the formative assessment in the form of affective assessment assisted by the website. The teacher uses the observational methods and mental recordings recorded on the website. This website has features like social media commenting and replying to comments. All teachers can also observe student progress from other teacher comments. So, the implementation of the evaluation of this school has been assisted ICT so teachers’ workload is reduced.

The use of the website has not been optimal in the formative assessment because the system is not optimized. The website only moves from paper based to computer based and records archiving. This website should be an opportunity to develop systems that facilitate the collection and presentation of results. The method of formative assessment is only used observation while there are other methods that can help also. Observation method has advantages that the understanding of teacher assessment criteria is superior and already have more experience. The weakness is that there can be objectivity assessment and the point of view is narrow because the teacher has not been able to recognize the character and background of the whole student. Formative assessment method that can be used to complete the observation result is self and peer assessment. Self assessment can be defined as a cycle consisting of
several stages of determining assessment criteria, directing itself to the search for feedback, self-reflection, and self-assessment considerations [5]. Peer assessment describes cycles consisting of stages of task involvement, peer analysis, feedback provisions, acceptance of feedback, and task revisions [5].

Based on the previous literature review, the students' critical thinking skill profile in the school was obtained. This profile is derived from self assessment of critical thinking skills and views of science teachers in the school. Aspects are asked on self assessment based on Ennis's theory of critical thinking which consists of providing a simple explanation, building basic skills, summing up, clarifying and organizing strategies and tactics [7]. The sample that conducted self assessment was 8th grader as many as 40 students. Questionnaire is a closed statement with Likert scale ranges 1-3 (less, enough, and good). Data analysis using descriptive analysis with presentation of percentage statement on closed questionnaire presented in the picture below. Point 1 is to give a providing simple explanation, point 2 building basic skills, 3 concluding, point 4 making clarification and point 5 organizing strategy and tactics.

![Figure 1. Results of Student Self Assessment Questionnaire towards The Ability of Critical Thinking](image)

The figure 1 shows that the critical thinking ability of junior high school students in grade 8 is in enough category for the dimensions of making clarification and strategy and tactics. While other dimensions obtained good results but did not reach more than 50%. It can be concluded that junior high school students are still in a position that their critical thinking skills are in enough category. Most of them are doubtful that their thinking has begun to enter the stage of critical thinking.

Second dimensions provide a simple explanation consisting of indicators focusing questions, analyzing arguments, asking questions and answering questions. They can identify or formulate problems, make summaries, and mention examples. The dimension of building basic skills consists of indicators considering whether the source is reliable or not and observing and considering observation reports. Students may provide temporary allegations of problems, collect data, report observation results, and use appropriate evidence. Students already understand how the scientific method to prove the phenomenon or case. The third dimension is the students can conclude. This dimension consists of deducting and considering the results of deduction, inducing and considering induced results, and making and determining the results of considerations. Students can draw conclusions from the initial hypothesis, draw conclusions as facts and draw conclusions from the results of the investigation. Dimensions provide clarification consisting of indicators identifying terms and considering a definition.
and identifying assumptions. Students can already define a thing and feed it into arguments. The fifth dimension is to organize strategies and tactics consisting of indicators to determine an action and interact with others. So the junior high school students in this school already exist in the position of critical thinking skills in the average category by reviewing the indicators of each dimension. Cognitive changes that enable increased critical thinking in adolescence may include (1) increased speed, automation, and capacity in processing information; (2) the content of broader knowledge in various fields; (3) increased ability to construct new combinations of knowledge; (4) the wider and spontaneous use of strategies or procedures in applying or acquiring knowledge [8].

Five dimensions that has been explained can be improved by self and peer assessment. Self and peer assessment is not just a method but a tool to create an atmosphere of other skills. Skills that can be influenced are critical thinking skills. Based on previous studies. The application of formative self and peer assessment does not provide an increase in cognitive ability. It provides enhanced critical and reflective thinking skills and can assess its own work and themes. The correlation between the assessment of the variables of this assessment of cognitive, psychomotor and affective variables is influenced by feedback. Feedback is given by friends and lecturers. Feedback is a crucial ability to apply this assessment. Not all students can provide effective and critical feedback. This requires training and habits to have an effect on learning. Feedback can be a positive input or loss. Lecturers as the main actors of the assessment get responsibility for the development of students' ability in providing good feedback quality [1].

Feedback is a measure of students' critical thinking skills. Viewpoints and explorative abilities of students can be identified through how the patterns and depth of feedback are provided. Kiu and Zang's study examined the use of anonymity in the provision of feedback. Identity does not contribute to improving outcomes but only gives the assessor more flexibility in providing appropriate comments. Feedback is the main thing in determining the outcome of the task after the discussion and peer assessment. Quality feedback that affects the scaffolding process to improve the quality of the task. If the scaffolding process is less precise based on the suggestion of the feedback then it would be useless [4]. Another study was supported by Sahsa et al that an insignificant increase was due to the inadequate feedback given and or the students had not been able to maximize the feedback. It is also caused by time management skills so that students can not practice until they reach maximum results [2]. Lanqin Zheng affirms that there is an increase in writing ability, metacognition, self efficacy and quality of feedback after a feedback synchronization discussion. This treatment provides a clear understanding and minimizes misunderstandings. Goals can be achieved because the assessment works effectively with a collaborative approach. The results of this study can be used as guidance lecturers and students when using the peer assessment website that the first online system is an effective learning to approach improving student learning ability. Both results can be used as a guide to integrate learning with discussion synchronization discussions to create an environment that is involved [9].

Leenknecht & Prins stated based on his results on elementary students that there is a difference between the experimental and control classes. The experimental class can provide wiser and broader assessment and feedback than control classes that tend to still feature their own products. This result is influenced by feedback given by students that the experiment class is more positive than the control class. Negative feedback there is no difference between the two classes. Experimental class that has knowledge of assessment criteria can be divided into 3 kinds of feedback that is authoritative, interpretative and explorative. Feedback that has three variations is what comes out of the students' judgment because of the criterion-making engagement [10].

Feedback is the main point of the formative assessment process taking place. Feedback provides guidance on how tasks or abilities can be improved according to criteria. This repair process should understand the feedback intent of the assessor without miscommunication. Miscommunication can be minimized by discussions between assessors and those assessed. Discussions will align the understanding of both parties. Sometimes a person's critical delivery can not be directly interpreted because it requires synchronization of thought. These critical skills also impact on other skills such as self efficacy, self regulation and metacognition. So feedback can measure critical skills

The ability to think critically requires a sustainable learning environment. Learning environment is influenced by curriculum factors. The curriculum used is 2013 that students are required to be active
with a scientific approach. The learning process according to the 2013 curriculum is of course used many learning models that create an atmosphere of learning according to the competence of the 21st century in this case is critical thinking skills. Learning is not only seen in models, methods and learning media only. However, the assessment process is also a complement to keep students' motivation and benchmarks. So critical thinking skills can be built when models, methods, media and assessment are in sync with psychomotoric goals in critical thinking. This alignment required assessment benchmarks to determine progress. The development is not only seen from the students as the main actors, but also the teacher as the person who controls the learning atmosphere. So based on the results of this study skill school students' critical skills profile, they can improve their critical thinking skills not only from the model alone. The new assessment approach can also be applied in order to be aligned from all stages. This new assessment is assessment for learning which becomes the new paradigm of learning assessment since the turn of the curriculum to 2013.

Assessment for learning using the formative method of self and peer assessment based on several previous studies that have been stated previously. This formative assessment can improve the critical thinking skill of the quality of feedback. The superiority of schools in the form of ICT-based media to assist the evaluation process can be developed for formative assessment. Not only in transferring data but maximizing the system inside. The system can be created by developing self and peer assessment. Students can carry out the assessment of these methods with efficiently assisted websites. Students can also provide feedback through the website with a secure or anonymous identity. This development could be an opportunity for further study to complete the evaluation at this school.

4. Conclusion
The assessment process at the school has not fully used the formative assessment in the 2013 curriculum. Formative Assessment still uses observation methods that have weaknesses and advantages. The disadvantage is that data tend to be objective and takes a long time and not comprehensive to the number of students that many. The advantage is the teacher as an appraiser has more qualifications and experience so that the distribution of values tend to be normal and the results of the assessment is quite complete because of the form of description. So this school has not applied other methods that is self and peer assessment.

The students' critical thinking skills profile matches the Ennis dimension consisting of providing a simple explanation, building basic skills, summing up, clarifying and organizing strategies and tactics. Based on the self-assessment of the five dimensions, it is found that 8th graders of 40 people are in the average category. This is because junior high school students in the development stage of their cognitive psychology just enter the realm of critical thinking.

Opportunities from the analysis of the implementation of formative assessment in this school is found that the media evaluation is very supportive with the website-based. However, formative assessment is not yet optimal in the use of the system on its website, as it is merely transferring data from paper to computer. So the opportunity is gained to develop a formative assessment with self and peer assessment method on the website. Wesbite will streamline the learning process of the 2013 curriculum to create a comprehensive atmosphere of critical thinking skills.

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