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Biology Teachers: Knowledge in Authentic Assessment Through Cooperative Integrated Reading and Composition Based Scientific Approach (Cirsa)

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ABSTRAK

Evaluation activities of biology learning process for learners is teachers' and education units' responsibility. An authentic assessment is crucial to be implemented in the learning process so that learners could be guided to have abilities in knowledge as well as attitudes and skills. The research aims in 2019 is to observe 50 biology teachers' differences in biology teachers' skills in Bekasi Regency, Indoensia in mastering authentic assessment knowledge in biology learning before and after the implementation of training activities through a Scientific Approach-based Cooperative Integrated Reading and Composition (Cirsa). Cirsa, a learning developed by integrating a CIRC-based scientific approach, axpected to facilitate teacher learning in accordance with the objectives. The research is a quasi-experiment using one group pretest-posttest design. The research independent variable includes Cirsa learning model, whereas the dependent variable is concept understanding of authentic assessment. The research data are analyzed using descriptive statistics that encompasses teachers' response on learning and analysis of average pretest and posttest. The research results indicate that there is an influence of Cirsa learning application on the concept mastery of authentic assessments of Biology teachers.

Keyword: CIRC, Cirsa, Biology teacher, Authentic assessment.

PENDAHULUAN

The 21st century requires people to be adaptive to rapid changes occur in the environment (Redhana, 2019; Tsai, Shen, & Lin, 2014). Changes also occur in education system in Indonesia (Djamahar et al., 2019; Djamahar, Ristanto, Sartono, Ichsan, & Muhlisin, 2018) that require a thorough transformation of learning process so that teachers in Indonesia could adapt to the existing condition. It is expected that teacher quality could be developed that could improve learners' knowledge quality, training, equity and achievement (Lewis, 2016; Pang, 2016; Ristanto, Zubaidah, Amin, & Rohman, 2018a). Education system improvement needs to consider educational principles. One of them is actively involving learners in learning activities; thus, teachers are no longer become a learning center and the learning become a learner centered (Setiawan, Corebima, & Zubaidah, 2013).

Strong, intelligent and independent generation that holds on to spiritual values is manifested through the implementation of the 2013 Curriculum (Afrianto, 2019; Lestari, Mertha, & Kusmiyati, 2019; Noviar, 2016). The 2013 Curriculum aims to build and empower Indonesian people who are competent as a person and a citizen who is faithful, productive, creative and affective as well as has a deep competence in community life (Djamahar et al., 2018). The new curriculum has a principle in prioritizing learning outcome in cognitive, skill and attitude aspects in

accordance with Indonesia's characters (Abdullah, 2016; Djamahar et al., 2019).

The 2013 Curriculum implementation is conducted using authentic assessment. The assessment is useful to assist teachers to improve learning quality (Charoencha, Phuseeorn, & Phengsawat, 2015; Naganuma, 2017; Villarroel, Bloxham, Bruna, Bruna, & Herrera-Seda, 2018). Therefore, teachers' knowledge on authentic assessment should be continuously empowered to achieve teachers' skill in developing and applying the authentic assessment in learning. It is especially in biology learning where various facts and obstacles are found. Various obstacles are found in the 2013 Curriculum implementation through authentic assessment in biology learning. Teachers face an obstacle in the 2013 Curriculum assessment. Based on observations and interviews, the obstacle is related to the assessment that coincides with learning process so that the teaching and learning process becomes less effective. The teachers feel burdened since they must add up every score obtained by the students and describe the score per subject. To overcome the obstacle, it is expected that the assessment scope could be reduced. Therefore, teachers expect the government to give an in-depth training for teachers who still have less understanding on the 2013 Curriculum (Abdullah, 2016). The obstacle also encounters by biology teachers in Bekasi Regency. It is difficult for them to implement the 2013 Curriculum through authentic assessment. The 2013 Curriculum directs teachers to teach through scientific approaches. The curriculum implementation with scientific approaches aims to provide understanding for learners in recognizing various content or information without depending on the teachers. The scientific approaches in learning involve the following skills: observe, ask, experiment, associate and communicate (Fajarianingtyas, Akbar, & Herowati, 2019; Susilo, 2016)

One of efforts to optimize teacher's assessment process is by improving the teacher ability in learning quality which includes the teacher's ability to access authentic assessments. Considering the importance of teachers having quality in providing learning at school and willing and able to carry out all the provisions relating to their profession, it is deemed necessary to provide education and training (Sudja, 2017). It can be conducted through, one of them, training using an appropriate learning model. The use of appropriate model in biology learning will improve teaching and learning activity effectiveness and efficiency (Kusumaningtias, Zubaidah, & Indriwati, 2013). The 21st century requires a learning model that could encourage learners to be active and find a concept independently.

Cooperative learning model is one of active learning models that emphasizes on group work to solve a problem. It could be defined as one of learning strategies that counts heavily on group learning (Darmawan et al., 2016). Learners are encouraged to learn in group by forming a small group to start learning that begins with planning, discussion to evaluation (Ilahi, 2016). These activities are conducted together so that all learners participate and have responsibility to create learning, collaborative groups also allow peer learning to occur, so learning will be more effective (Darmawan, 2019).

Cooperative learning model is known in its various types. Learning that emphasizes reading activity is Cooperative Integrated Reading and Composition (CIRC) learning. CIRC is the basis for developing Cirsa, so it is important to discuss it before going further. The learning model could monitor and activate learners' reading activity. It is a learning process that emphasizing learners to involve in e learning process through activities of reading, discussion, concept finding and rewriting it with opinion and reflection (Camacho & Legare, 2015;

Gupta & Ahuja, 2014; Kivunja, 2014; Mutrofin, Degeng, Ardhana, & Setyosari, 2017). The learning activity could provide opportunities for learners to explore information through reading, discussion and rewriting activities in group.

Scientific approach-based Integrated Reading and Composition (CIRC) learning model stresses on learning aspect that is not only emphasizing on reading and writing processes but also scientific activities, such as observe, ask, try/experiment, associate and communicate (Djamahar et al., 2018; Ekawati, Susetyarini, Pantiwati, & Husamah, 2015). CIRC learning model is in accordance with the 2013 Curriculum that expects teachers to conduct learning using a scientific approach. The Cirsa model is designed with CIRC learning model principles that underscore reading process (Ristanto, Djamahar, Heryanti, & Ichsan, 2020; Djamahar, Ristanto, Sartono & Darmawan, 2020). The reading activity is an often neglected process in learning, especially in conventional learning (Djamahar et al., 2018). It causes learners' reading ability to decrease, whereas high literacy activity has positive impact on learners' learning in the classroom (Olander, 2013; Surpless, Bushey, & Halx, 2014; Yacoubian, 2018). According to Djamahar et al., (2018), the model superiority lies on its ability to be used for all contents in Biology subject since the subject contains daily life concepts and it must be understood through reading. Based on the background that CIRC enriched with a scientific approach merges into an effective learning model. The Cirsa model development design is equipped with learning media of syllabus, learning plan and learner worksheet

The approach would provide opportunities for learners to experience it themselves, to follow a process, observe an object, analyze, prove, and draw conclusion on a circumstance by themselves (Noviar & Hastuti, 2015). In learning process, the learning model applied by teacher has not accommodated a scientific approach, including CIRC learning model; therefore, the scientific approach based CIRC learning model or Cirsa is expectedto encrease teacher's ability to access student authentic assessments.Based on the existing researches, the researcher tries to design and prove the influence of a scientific approach-based Cooperative Integrated Reading and Composition (CIRSA) learning model on the strengthening of teachers' authentic assessment understanding to learners. The model stresses on participants' activities to involve in training process through activities of reading, discussion, concept finding, and rewriting it with opinion and reflection (Gupta & Ahuja, 2014). The scientific approach is the 2013 Curriculum implementation that is intended to provide understanding to learners in recognizing various content or information without depending on teachers. When the Cirsa model is applied in classroom learning, it is expected to improve understanding of authentic assessment by the teachers of MGMP of Biology in Bekasi Regency and give insight about the Cirsa application in classroom learning.

The mastery of concept is defined as one's ability in mastering experiences in the form of concepts, principles as well as laws in science as information ever given to students (Lancor, 2014; Ristanto et al., 2018a). Mastery is an understanding or capability of using knowledge, intelligence and so on by someone to solve problems or issues (Araya et al., 2010; Gündüz, Alemdağ, Yaşar, & Erdem, 2016; Istiana & Awaludin, 2018). Concept mastery is one's ability to explain with their understanding of content. It is an effort that must be done by someone in recording and re-transferring some information from a certain subject content and using it to solve problems, analyze and interpret a certain event (Lancor, 2014; Leong, Mohd Said,

Shahrill, & Perera, 2016). Concept mastery is an ability to capture definitions, for example, ability to reveal content that is presented in a more understandable form, ability to give interpretation and apply understand the meaning of authentic assessments and their application.

According to Gunawan *et al*., (2016) the measurement of concept mastery is conducted in learning by compiling essay test based on Bloom's Taxonomy C1 to C6. Based on the study, it can be concluded that Biology concept mastery is students' ability to understand, interpret and apply content and it can be used to solve problems. Indicators used are cognitive realm of Bloom's taxonomy consisted of six cognitive process dimensions. The six dimensions include: remember (C1), understand (C2), apply (C3), analyze (C4), evaluate (C5) and create (C6).

Evaluation activity of learning process to learners becomes teachers' and related education unit's responsibilities. It comprises learning process and outcome by applying principle of continuous learning completeness. Types of learning outcome evaluation in education units consist of a) class assessment; b) final test; c) basic ability test; and d) quality assessment. Learner evaluation is performed periodically, thoroughly, transparent and systemic to achieve certain competence standard.

The 2013 Curriculum implementation encounters various obstacles. The obstacles include teacher's evaluation technique must be real and authentic, difficulties in scientific approach implementation in learning process and difficulties to develop a learning process that could make students active (Ristanto, Zubaidah, Amin, & Rohman, 2017). The authentic assessment is essential to be applied in the learning process so that learners could be guided to not only have abilities in knowledge but also attitudes and skills. The demand of the 2013 Curriculum includes authentic assessment. Once it is prevailed, the authentic assessment is considered as an appropriate assessment to appraise learners' learning outcome. It is in accordance with Permendikbud No. 104/2014 article 2 paragraph 2 stating that authentic assessment is the main approach in appraising learners' learning outcome by educators.

Training is a type of learning process to acquire and improve skills outside the applicable education system in a relatively shorter period of time and with methods that prioritize practice rather than theory, so the theme of increasing the ability to apply authentic assessment in learning classes to teachers was taken. The training conducted here is ongoing training that focuses on the use of authentic assessments and their use. The authentic assessment is an information collection process by teacher on the development and learning achievement conducted to learners through a variety of techniques that able to appropriately reveal, prove, or indicate that learning objectives have been mastered and achieved.

The assessment is not only emphasizing on the cognitive aspects but also the affective and psychomotor aspects. Problems occurred in Bekasi Regency include lack of skill among biology teachers in the implementation of authentic assessment in learning activities. It indicates teachers' less understanding of the method. Teachers have difficulty in implementing the authentic assessment with the right procedures. The condition is related to activities that support the implementation that have not intensive. Therefore, ongoing discussion activity for teachers is required on how the implementation of authentic assessment.

The authentic assessment could be applied in line with the application of learning model. One of the appropriate learning models is a scientific approach-based learning. A new learning model that integrates the approach is Cooperative

Integrated Reading and Composition (CIRC). The integration is CIRSA, which is a learning model that could help teachers in applying authentic assessment to be more contextual through reading (Djamahar et al., 2018).

In its development, authentic assessment in 21st century learning experiences some changes. The presence of technology changes the way teachers assess their students' ability, which is no longer have to use a paper. Authentic assessment can be done using technology. Teachers could use certain applications, such as *edmodo*, *kahot* or google classroom, which is the simplest application. For example, a teacher wants to assess their students' abilities in conducting presentation in front of the class. The authentic assessment that can be done is by giving assessment in the form of Google form to their peers (Barber, King, & Buchanan, 2015; Bolat & Karakuş, 2017). Based on the description, authentic assessment could be combined with Cirsa as a technology-based learning.

METHODS

Research Design

The research used one group pretest-posttest design. The independent variables applied in the model was Cirsa learning model, whereas the dependent variable was concept understanding of authentic assessment of MGMP Biology teachers in Bekasi Regency, Indonesia. Research activities include the delivery of material on authentic assessment in general and the implementation of biology learning in high school. Question and answer activities and discussions and continued with the assignment of developing authentic assessment instruments and presenting products. The syntax refers to Cirsa learning. The research design is illustrated in Table 1.

Table 1. One group pretest-posttest experimental design.

Pretest	Treatment	Posttest
T_1	X_1	T_2

Note: T_1 = Pretest, T_2= Posttest, X_1 = Cirsa Learning

Population and Sample

The research population was all SMA (senior high school) Biology teachers in Bekasi Regency. Sampling was conducted using random sampling technique to select one group that would be treated with Cirsa learning. The biology teachers involved in the research consisted of 50 teachers.

Research Instruments

The research instrument was an authentic assessment understanding with six questions. The instrument was valid and reliable, which was carried out by a trial of Biology Teachers in Bogor Regency, Indonesia. Grids, questions, rubric assessments, and key test answers were developed by referring to Bloom's taxonomy for assessing biology teachers' knowledge about authentic assessment. The research was done in several stages, namely: pre-test, delivery of authentic content assessment through the Cirsa learning model, and post-test.

Data Analysis

The research data collection results were analyzed using descriptive statistics. Normality and homogeneity tests were performed as a requirement for hypothesis testing. The normality test used One-Sample Kolmogorov-Smirnov, whereas the homogeneity test used Levene's Test of Equality of Error Variances. The hypothesis testing used paired t-test and all the testing techniques were conducted with statistical analysis program of SPSS 23.0 for Mac with significance level of 0.5%.

RESULTS AND DISCUSSION

The analysis of pretest and posttest score data on authentic assessment

knowledge of teachers of MGMP of Biology in Bekasi Regency is presented in Table 2.

Table 2. Average Score of Authentic Assessment Knowledge.

No	Topic	Average	
		Pretest	Posttest
1	Authentic assessment definition	30.50	67.50
2	Authentic assessment forms	35.00	70.85
3	Authentic assessment scopes	40.00	75.25
4	Authentic assessment implementation in biologi learning	45.00	60.20
5	Authentic assessment relevance to the 21 st Century Skills	25.85	60.35
	Average	35.27	66.83

Based on Table 2, it is known that the weakest aspect of the biology teachers before the implementation of authentic assessment training was difficulties in connecting the assessment with the relevance of must-have skills by biology teachers. The pretest results also indicated that teachers had been implemented several authentic assessments into biology learning; however, they faced difficulties when they were asked to explain related theories, definitions, forms, and scopes of authentic assessment. The assessment results after posttest suggested that teachers' understanding of authentic assessment increased. The teachers were capable of understanding the definition, forms and scopes of authentic assessment after learning through Cirsa model. The results of response questionnaire given to the teachers regarding the training activities are displayed in Table 3.

Table 3 Summary of Teachers' Response Results on Authentic Assessment Skill Empowerment Learning Process.

No	Statement	N	Average	Category
1	After the activity, I am interested to learn more on authentic assessment development	50	3.65	Strongly Agree
2	The speakers master the content on authentic assessment development	50	3.77	Strongly Agree
3	After the training activities, I gain new information through discussion on authentic assessment development	50	3.62	Strongly Agree
4	After the training, I understand the authentic assessment procedures and its various forms.	50	3.46	Agree
5	Authentic assessment is easy to develop in biology learning	50	3.62	Strongly Agree
6	Authentic assessment needs to be applied in biology learning	50	3.73	Strongly Agree
7	According to me, authentic assessment development will add my works load as a biology teacher	50	2.15	Disagree
8	Authentic assessment provides fairness to learners	50	3.62	Strongly Agree
8	After the training, I have more understanding on the importance of authentic assessment	50	3.62	Strongly Agree
9	Authentic assessment is essential to be applied in biology learning	50	3.65	Strongly Agree
10	Each learner in biology learning is unique and has potential for community success	50	3.77	Strongly Agree
	Average	50	3,51	Strongly Agree

According to Table 3, it can be concluded that the teachers of MGMP of biology in Bekasi Regency agreed that the authentic assessment training provide better understanding and motivation. The teachers also understood the importance of authentic assessment in providing fairness in the assessment process and believed that each participant is unique and has their own strengths and weaknesses. It is required in fair evaluation of learners' learning outcome.

The result of normality test of authentic assessment knowledge data obtained a significant value (level) in all posttest groups (0.450) that was greater than the alpha of 0.05. It suggested that Ho stating that the biology teachers' authentic assessment concept understanding is not deviated from normal distribution data was accepted. The homogeneity test for biology teachers' authentic assessment concept understanding posttest data obtained a significant value of 0.278, which was greater than the alpha of 0.05; therefore, H_0 stating that variance between biology teachers' authentic assessment concept understanding data was not different or homogeneous was accepted.

Table 4 Summary of Analysis Prerequisite Tests.

Test	Sig.	α	Description
Normality	0.450	0.05	Normal
Homogeneity	0.287	0.05	Homogeneous

Based on the result of hypothesis testing using paired t-test method with SPSS program (Table 5) it was found that the sig. value was 0.000, which was smaller or equal to 0.05. It can be concluded that there was a difference between pretest and posttest after the application of Cirsa learning in discussion of MGMP teachers' authentic assessment in Bekasi, West Java.

Table 5 Summary of analysis paired t-test.

Test	N	α	p value	Result	Keterangan
Paired t-test	50	0,000	0,05	$p < \alpha$	H_0 rejected

The research aimed to analyze the influence of Cirsa learning model application on biology teachers' authentic assessment knowledge in Bekasi Regency, West Java. The research result indicated that there was a difference in biology teachers' authentic assessment understanding before and after the implementation of content delivery activities through Cirsa learning model. The posttest score results were higher than the pretest results on authentic assessment understanding in biology learning.

Cirsa contribution to the achievement of authentic assessment understanding for biology teachers was related to Cirsa learning syntax. The Cirsa learning model is a learning design innovation by modifying CIRC type cooperative learning model with scientific approach (Djamahar et al., 2018). In the 2013 Curriculum, teachers are expected to apply scientific approaches in classroom learning. The scientific approaches consist of 5M (*Mengamati, Menanya, Mencoba, Menalar, dan Mengkomunikasikan*) or (observe, ask, try, reasoning and communicate). The learning model stresses on a learning aspect that is not only focusing on reading and writing processes but also scientific activities, such as observe, ask, try/experiment, associate and communicate (Djamahar et al., 2019).

The scientific approach-based CIRC learning model is a learning design that is in accordance with the 2013 Curriculum that expects teachers to apply learning using scientific approaches (Burhanudin & Sodiq, 2018; Marjan, Arnyana, & Setiawan, 2014). Teachers encounter a variety of obstacles in the 2013 Curriculum implementation (Abdullah, 2016; Merta,

Suarjana, & Mahadewi, 2015). The Cirsa learning model is designed in accordance with the cooperative learning principles and it has characteristics in terms of discussion, reading and presentation. The reading activity is an often-neglected process in learning, especially in conventional learning (Djamahar et al., 2018). It causes one's reading ability to decrease, whereas high literacy activity has positive impact on learners' learning in the classroom (Ekantini & Wilujeng, 2018; Sarkar & Corrigan, 2014; Udompong, Traiwichitkhun, & Wongwanich, 2014).

The superiority of Cirsa learning model in improving authentic assessment was related to the division of teachers into 6 (six) groups. The division of group was based on authentic assessment types. Each group focused to analyze authentic assessment types. Discussion activity in group would make members positively depended to each other, which was in accordance with cooperative learning principle (Ristanto, Zubaidah, Amin, & Rohman, 2018b). The success and target achievement would be influenced by every member (Baloche & Brody, 2017; Navarro-Pablo & Gallardo-Saborido, 2015). Goals achievement was based on the definition of authentic assessment types, types of instrument used, and example of authentic assessment instrument in biology learning.

The Cirsa learning model was proven to help the biology teachers to combine reading and writing activities with scientific approaches. These activities were integrative activities in the implementation of authentic assessment understanding in biology learning. Reading learning with Cirsa model consisted of several main elements, namely: group formation activity, learning source searching, analysis and presentation. These activities were based on scientific approaches.

The CIRC type cooperative learning is one of learner-centered learning models (Gokhale, 1995; Liu, 2007; Loes & Pascarella, 2017). In the research, the active activities conducted were emphasizing on group work by the biology teachers to solve problems together, which was mastering the authentic assessment of biology learning. The cooperative learning also named as one of learning strategies that emphasizes group learning (Nam, 2017; Osho & Williams, 2018; Unin & Bearing, 2016; Wallace, Preston, & Harvie, 2016). The virtue of group in the research encouraged the biology teachers in the activities to learn together by forming small groups and analyzing types of authentic assessment. The activities started with planning, which was by collecting information related to the authentic assessment types from various sources.

Next, discussion and up to evaluation were done together so that all teachers participated and had responsibility to produce ideas on authentic assessment development. By conducting discussions in the Cirsa syntax there will be pedagogical communication between the teacher and the teacher. The communication activities include; guide, direct, educate, and foster interpersonal potential. Pedagogic communication is able to create effective learning. The nature of an effective learning is a learning process that not only focuses on learning outcomes but also the learning process. The learning process here is expected to be able to provide a good understanding, the process of internalizing knowledge, and changes in the way of thinking of teachers who are expected to change their views and ways of teaching (Suyatno, 2019). Some previous studies have found that there is a correlation between pedagogic communication and effective learning, which means that in Cirsa learning involves the principles of pedagogic communication, the learning process in the classroom will be effective.

The cooperative learning model is known in various types. Learning that gives emphasize to reading activity is Cooperative Integrated Reading and

Composition (CIRC) learning. The learning model could monitor and activate learners' reading activity. This learning process underlines learners' active involvement in the learning process through such activities as reading, discussion, concept finding and rewriting it through opinion and reflection (Liu, 2007; Mozzer & Justi, 2012; Mutrofin et al., 2017; Tesfaye & Berhanu, 2015). The learning activities could provide opportunities for learners to explore information through activities of reading, discussion and rewriting it in a group.

The research findings indicated that increased understanding of authentic assessment in biology learning through Cirsa learning was in significant category. The Cirsa learning was not only effective to be applied in biology learning at the secondary school level (Djamahar et al., 2019, 2018) but also effective in improving biology teachers' understanding of authentic assessment. It is also appropriate to be applied in various levels to improve knowledge.

In its implementation, Cirsa could be used with a variety of technological devices. The presence of technology in learning is very helpful in performing classroom learning innovation. In Cirsa utilization, technology could play a role as a tool to perform authentic assessment. The technology facilitates the assessment, especially for students in the secondary school level where Smartphone is familiar amongst them. Therefore, it will be easy for students to answer questions given by the teachers using the Smartphone. As consequence, it will support the learning (Boholano, 2017; Qian, Owen, & Bax, 2018).

The likely-to-occur obstacles could be related to internet connection that must be provided by the school. Students might encounter difficulties in accessing internet during biology learning with Cirsa. The obstacle could hinder the implementation of authentic assessment. The school, as a facilities and infrastructures provider, must be able to facilitate the obstacle so that students could learn well. The use of technology could also support the 21st century learning. Students who are less able to use technology in learning will find difficulties to compete in the 21st century learning (Boholano, 2017; Farisi, 2016).

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CONCLUSION

The research results indicated that Cirsa learning is able to provide increased understanding to teachers of the importance of using authentic assessments in learning Biology, in bekasi. The results also strengthen other research results on the Cirsa learning effectiveness model to improve the ability of teachers in the use of authentic assessments in Biology learning in high school. It is expected that further research could test Cirsa learning model effectiveness on effective and psychomotor aspects both in school and teacher levels.

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