Unnes.J.Biol.Educ. 9 (1) (2020)

Journal of Biology Education

http://journal.unnes.ac.id/sju/index.php/ujbe

Implementation of Cambridge International Curriculum in Biology Learning and its Impact on Critical Thinking Skills of Students in Semesta Senior High School

Suhaila Zakiya Najah✉, Ning Setiati[1]

Biology Department, Faculty of Mathematics and Science, Universitas Negeri Semarang, Indonesia

Article Info

Article History:

Received : *January 2020*
Accepted : February 2020
Published : April 2020

Keywords:
Cambridge curriculum; critical thinking; impact; implementation

Abstract

Most of international schools in Indonesia are applying the Cambridge International Curriculum (CIC). This study aimed to explore the implementation of Biology Cambridge International Curriculum in Semesta SHS and investigate its impact on students' critical thinking. It is important to manage the curriculum implementation so as to actualize curriculum goals. This qualitative study employed a case study design and purposive sampling. A curriculum coordinator, a biology teacher, and 35 students were purposefully chosen to be a part of this study, so the samples are 37 people. Exploration of the implementation of CIC was performed using interview sessions, teaching-learning observations, and written materials. Open-ended questions were distributed to thirty-five students and interview 15 students to investigate the critical thinking of students. The findings of this study showed that Semesta SHS provided quality amenities for students to support teaching-learning activities and students scored high in critical thinking tests. Major findings from this study concluded that Cambridge International Curriculum was highly implemented and well managed by Semesta SHS so that this implementation had a great impact on the critical thinking skills of students.

✉ Correspondence Address:
D6 Building, 1st Floor, Jl Raya Sekaran Gunungpati Semarang
Email: suhailaznajah@gmail.com

p-ISSN 2252-6579
e-ISSN 2540-833X

INTRODUCTION

Nowadays the number of international schools in Indonesia continues to rise, including Semarang. International school is a school that adopting international education to give an international educational environment for students. Most International Schools in Indonesia are applying the Cambridge International Curriculum (CIC). Cambridge International Curriculum is an education program that is known for its best in preparing students for life, helping them develop the skills students need to achieve at school and work (UCLES, 2018). According to Keumala (2013), Cambridge International Curriculum helps students to be creative and independent. CIC also helped students to have a sensitivity to humanity's sense, environmental awareness, and skills. Elizabeth (2014) emphasizes that the implementation of CIC affecting students learning and achievement. The National Curriculum of Indonesia had changed many times since 1947 (the first curriculum) and the latest curriculum is called Kurikulum 2013. Curriculum changes were executed as an effort to improve the quality of education in Indonesia. However, if we look at Program for International Student Assessment (PISA) 2015 results, Indonesia was ranked at 62nd out of 70 countries and ranked at the last position compared to all the other ASEAN member that involved in the study (OECD, 2017). Based on PISA 2015 test reports, we get to know that Indonesia students seem unlikely to have 21st-century skills yet and they might not be ready to face the global era yet.

One of the 21st-century skills that essential and needed for life is critical thinking. Critical thinking is a scientific attitude and an ability figuring things out then analyze it to make a decision (Lin, 2018, p. 2). These days, there are many problems in our daily life like global warming, deforestation, and plastic waste crisis that need various types of innovative solutions. Biology is a subject that enables students to develop scientific attitudes by teaching and training them to transfer their learning into daily life situations also connect biology to any other area. Students are expected to be able to find solutions to problems in our daily life by learning biology. These skills not only needed in their workforce but also in their daily life. (Butterworth & Thwaites, 2013) stated that critical thinking contributes to learners' success in education and life, since it is a crucial instrument of study, for resolving troubles and creating well judgments. Critical thinking guide learners to advance other skills, like a higher level of focus, profound analytical skills, and enhanced thought processing. There are three basic activities of critical thinking, are analysis, evaluation, and further argument.

Semesta Senior High School is one of a private school in Semarang that construct their curriculum by applying Cambridge International Curriculum and is known for its success in providing knowledge to its students. This statement can be proved by students' achievement in the national exam. According to the results of 2017 National Exam of Indonesia, Semesta School was ranked 4th in municipal level (Dinas Pendidikan Kota Semarang, 2018). Based on that aspect, the research is needed to be conducted.

The following research objectives of this study: (1) Explored the implementation of Biology Cambridge International Curriculum in Semesta Senior High School; and (2) Investigated the impact of the implementation of Biology Cambridge International Curriculum in Semesta Senior High School on students' critical thinking. My findings offer useful information about the management of Cambridge International Curriculum Biology, the teaching-learning activity of biology, and the critical thinking skills of students in Semesta Senior High School.

RESEARCH METHOD

This study was designed as a descriptive qualitative study, using the case study method in which I explored the management of Cambridge International Curriculum Biology in Semesta Senior High School and investigated its impact on students critical thinking skills. Case study research intends to produce a profound insight, many-sided of a complex matter in its real-life contexture (Crowe et al., 2011). All the participants were from Semesta Senior High School Semarang. The participants for this study were the Curriculum Coordinator of Semesta Senior High School, an AS Level biology teacher, and two female classes of 11th grade students (C and D class). C class consist of 17 students while D class consist of 18 students. I involved both female classes because they had known and adapted to the environment and policies in the school for one year, and they had passed the matriculation period carried out in the first year

of entering school. Also they can give more information and more precise results related to this study than male classes. This study was involving female students of 11th grade because they had known and adapted to the environment and policies in the school for one year, and they had passed the matriculation period carried out in the first year of entering school. The reason I chose female class instead of male class was that the female class can give more information and more precise results related to this study. I conducted interview to all participants, observing teaching-learning process and collecting documents needed to seek information related to the implementation of the curriculum. I distribute questions to the students to know their critical thinking skills.

Major data collection involved taking observation notes for classroom interactions within biology teaching-learning activity and audio-recording interviews with a curriculum coordinator, an AS Level biology teacher, and fifteen students. Each class session lasted for 80 minutes, while each interview lasted for about 30 minutes. I observed two class session of class C and two class session of class D, for a total of approximately five hours. In this study I conducted interviews to a curriculum coordinator, a biology teacher of 11th grade, and 15 students (out of 35 students which I ask them to fill critical thinking skills questions), made observations, and ask 35 students to fill critical thinking skills questions. According to Cresswell (2012), qualitative research allows a researcher to study a single individual or multiple individuals depending on the research problem the researcher would like answered in a study. A researcher can decide the sample size by inspecting some publications or previous related studies and look at the number of participants researchers used. He emphasized that normally the sample size researchers can use ranging from 1 to 40, so choosing 15 students to conduct the interview is enough. My own reason for choosing 35 students to fill critical thinking skills questions was because the total number of 11th grade students in Semesta Senior High School is 77 students and there are four classes which consist of two female class and two male class. I think choosing two class out of four class is enough to give me information related to this study. I also distributed critical thinking questions to 35 students and obtained documents need such as academic calendar, timetable, annual plan, and past paper. Female class were selected for this study due to their ability in providing informations related to teaching-learning activity and their achievement in science olympiad and science projects.

I created themes and codes for the implementation of Cambridge International Curriculum AS Level Biology and the critical thinking skills of students. Codes of curriculum implementation include the component and program requires to implement curriculum referring to Cambridge International Curriculum guidebook. Cambridge International Education required the school to meet the following qualifications, including (Stobie Tristian, 2019):

1. The school's visions and values,
2. A quality teaching and learning,
3. School leadership, environment and culture,
4. The school's curriculum and subject curricula,
5. Assessment practices and expectations, and
6. The school's internal structures and operations.

This study employs qualitative analysis (deductive coding) by creating themes and codes, identifying patterns and connections of the data obtained through interviews, school and classroom observations, and documents. I also giving a score of critical thinking questions assisted by Facione rubric. Deductive coding is effective to find the key data and left the minor stuff behind. Investigator and methodology triangulation are used for verifying the validity of the data. Triangulation is a method of verifying proof from diverse individuals, a variety of data, or methods of data assembly (Cresswell, 2012, p. 259). As for critical thinking skills analysis, this study follows Facione and Carlin (2015) conceptualization of six aspects of critical thinking skills, including: (1) interpretation; (2) analysis; (3) evaluation; (4) inference; (5) explanation; and (6) self-regulation. A four-point scale was used to assess students' critical thinking skills: 4 = strong; 3 = acceptable; 2 = unacceptable; and 1 = significantly weak. There are two topics in the questionnaire, including lifestyle and plant cells. Respondents were given cases that related to advertisement of tobacco products,

Bulimia nervosa, and plant cells and they were asked to answer 10 questions (6 questions related to lifestyle and the rest are plant cells).

RESULTS AND DISCUSSION

In this chapter the findings of the study are presented and sought possible explanations for the observed findings, relating them to the literature and theoretical framework discussed at the beginning of this report, which was an attempt to know the implementation of Cambridge International Curriculum and the impact on critical thinking skills of students in Semesta Senior High School.

Implementation of Cambridge International Curriculum Biology in Semesta Senior High School

Implementation of Cambridge Curriculum in Semesta Senior High School described by compatibility of biology learning management and syllabus Cambridge Curriculum. Based on interviews that have been conducted with curriculum coordinator, Semesta Senior High School has successfully implemented the curriculum well to achieve learning goals by maintaining the quality of teachers and learning activity, as well as following the rules set by Cambridge and Ministry of Education and Culture of Indonesia as a *SPK* school. Regulation of the Ministry of Education and Culture of the Republic of Indonesia No. 31 of 2014 stated that *Satuan Pendidikan Kerjasama* are managed on the basis of cooperation between accredited Foreign Educational Institutions and Indonesia Educational Institutions, both formal and informal. Indonesia Educational Institutions are allowed to build partnership with Foreign Educational Institutions if they have been accredited by National Accreditation Board.

Based on student list of Semesta High School, 256 students out of a total of 271 are Indonesian whose main language is not English. For this reason, Semesta High School has been providing a matriculation program for new students. This program aimed to break the language barrier and improve students' English proficiency, so they could actively be engaged in learning activities. Vihman (2018) emphasized that International Institutions in a country where English is a second language have control in supporting English language skills of students for ensuring a balanced and principled approach in teaching-learning activities. This sort of support would help students to prepare for globalization. Other supports were given to the students such as various extracurricular, digital tools, 24/7 internet access, and comfortable learning environment. These kind of facilities matched with Cambridge International Education which require the school to provide a quality of teaching and learning also a good environment for students. Information derived from the analysis of observation checklists, documentation of school facilities and interview scripts with curriculum coordinator, biology teacher, and students assisted me in developing characteristics of biology teaching-learning management in Semesta Senior High School:

Table 1

Overview of biology teaching-learning management in Semesta Senior High School Emerging from the Data

Aspect	Description
School program	1. 'A' accredited by National Accreditation Board. 2. Implementing IGCSE and AS Level of Cambridge International Curriculum. 3. Provide teacher group discussion and department meeting for quality control. 4. Support teacher professional development
Approaches to teaching	1. Provide access to digital tools. 2. Implementing three types of learning environment, are student-centered, knowledge-centered, and assessment-centered. 3. English as main language 4. Provide a variety of learning resources. 5. Provide opportunities for the development of the desired skills and learner attributes. 6. Assessment and feedback based on participation in learning, involving student participation
Key activities	1. Drawing plant cells and tissue then presenting them to peers and teacher 2. Studying examples of cases 3. Watching and review videos related to the topic.

	4.	Solving critical thinking questions, starting with 'why'
	5.	Presenting a topic in seminar-style
	6.	Analyzing other's people work
	7.	Providing one-by-one basis feedback
Teachers	1.	Able to use ICT resources.
	2.	Able to teach in English.
Facilities	1.	24/7 internet connection.
	2.	Laboratory with good equipment.
	3.	Interactive whiteboard.
	4.	Chromebook.
	5.	Outdoor space.
	6.	Guidance service.
	7.	Library.
	8.	Small class size.

According to Table 1, overall Semesta Senior High School has been providing amenities for students so that the teaching-learning process runs well. They also regularly monitor the facilities to avoid errors and the assessor of Cambridge International Education annually check the facilities, the teaching-learning process, the quality of teachers, and the management of the curriculum. Semesta

Task and assessment were given online using Google Classroom, since this school has a program called One Laptop per Child, so the students could do individual task in class. Embedding ICT resources within teaching-learning process is essential because this kind of approach would give positive environments of learning activities. Increasing in ICT use could lead to higher students' performance. A recent study stated that ICT use has a positive impact which is could enhance the process of learning and individual student performance, although teacher role in stimulating ICT use accounts for a major part of this relation (Haelermans, 2017). Physical learning environment play a notable role in creating a smooth teaching-learning process. A quality and precisely designed physical environment will foster the development of students' potential and here are the characteristics of quality physical environment (Kleberg, 2016; Shaari & Ahmad, 2016): (1) accessible to and inclusive; (2) safe and secure for all; (3) supported with adequate resources and infrastructure; and (4) reasonable class sizes. According to these characteristics, learning environment in Semesta Senior High School met the requirements for the quality learning environment since the provided facilities met students' needs with adequate numbers of qualified teachers and support staff.

According to interviews that had conducted with a curriculum coordinator and a biology teacher, this school has a program to manage the quality of teaching-learning activities including teacher professional development. So teachers are actively involved in a variety of teacher development program organized by Eduversal Indonesia, Ministry of Education and Culture and Indonesian Teachers Association. This school always supports teacher professional development by annually involving teachers in a variety of teacher professional development including: (1) Development of Teaching Proficiency (Educamp) program, (2) teacher training program organized by MGMP, (3) teacher conference, (4) ICT training, and (5) Teacher competency testing. Engagement in teacher professional development program could decrease problematic learning since this program bring innovation and awareness of problems to teachers. Professional development could be a helpful way of supporting teachers for improving teachers' knowledge as well as nurturing students' academic competence, such as skills, attitudes, and behaviors (Kalinowski, Egert, Gronostaj, & Vock, 2019; Vermunt, Vrikki, van Halem, Warwick, & Mercer, 2019).

According to observations, the teaching-learning process highly covered the learning activities of unit four transportation and gas exchange comprised in the syllabus, from basic activities to challenging activities. There are two suggested learning activities included in biology annual plan and these aims to present horizons to teachers how to challenge students and what are the required activities, so the learning objectives covered and learning process went well. Nottingham (2017, p. 78) emphasized that teachers must put challenge at the heart of the lesson since challenge drives students to probe contradictions and unpredictability, as well as help students, move out of their comfort zones. The excellence of education

management in Semesta High School is applying small class size limiting the number of students to 24 people for each class. This management brings positivity to the teaching-learning process which impacts students' performance. As stated in observation notes, the teacher was able to ask higher-order thinking questions to all students and all of them have an opportunity to present their work to peers and teacher. According to observation notes, the teacher was also able to monitor students' activities thanks to small class size system. Most research and commentary on class size conclude that class size matters in school. Smaller class size increases teachers' chance to engage more students in class as well as monitor, manage and keep the students on track. This system also enables students to build their understanding more since they have opportunities to feed their curiosity (Argaw & Puhani, 2018; Francis & Barnett, 2019; Shi, 2019).

A quality biology teaching-learning was carried out in Semesta High School. Based on conducted observations, the teacher was implemented various models of active learning activities, including (1) drawing, (2) group activities, (3) storytelling, (4) sharing perspectives and (4) presenting project. Students were given chances to advance knowledge through interaction during teaching learning activities. These activities might help the advancement of the intended skills and students' attributes, such as self-confidence, creativity, communication skills, innovation, and public-speaking skills. These teaching-learning activities matched Fisher, Frey, & Nelson (2012) statements which explained that high-quality teaching implemented an instructional framework to reach effective learning, including (a) focused instruction, (b) guided instruction, (c) collaborative learning, and (d) independent learning. Earlier research has established that active learning provides a chance for both students and teachers socializing and being more engaged in a way that promotes discussion and critical thinking as well as developing on preexisting knowing. It is essential for teachers being up with the sundry methods of learning, frameworks for addressing goals, appraising competency, problem-solving skills, and learning outcomes during the planning and executing their teaching strategy (Torralba & Doo, 2019). Following are several pictures showing characteristics of biology teaching-learning activities.

Figure 1 biology teaching-learning activities.

Referring to conducted observations and interviews, the teacher conducted both formative and summative assessment. Teachers gave mini quizzes and classwork as well as plus point (performance) to students as formative assessment, while summative assessment were implemented by conducting sub-unit test, projects, midterms and end-of-term exams. Both formative and summative assessment are crucial and must be conducted in teaching-learning process for evaluation. Formative assessment helps teacher to spotting prospective and bona fide impresses on the teaching-learning process. By conducting a formative assessment, teachers were expected to notice the barrier students face and students' advancement continuously during teaching-learning activities as well as do personal introspection (Elwy et al., 2019). Summative assessment was delivered to pass judgements according to a set of specific standards, usually declared through performance grades. Its assessment most often held in writing, sometimes accompanied by oral. Formative and summative assessment must be implemented in great harmony in order to acquire an explicit evaluation (Evans, 2013).

Impact on Students' Critical Thinking Skills

Impact of implementation Cambridge International Curriculum Biology on students' critical thinking skills measured by conducting interviews and giving a critical thinking questionnaire (open-ended questions)

that referred to Facione & Carlin (2015). The interview was conducted in a curriculum coordinator, a biology teacher, and fifteen students of 11th grade. A curriculum coordinator and a teacher were interviewed to know how they promote critical thinking skills while students were interviewed to explore their critical thinking attributes. I refer to Pearson (2019) to seek the characteristics of critical thinkers and compare it to students interview results. Questionnaires were handed out to 35 students of 11th grade in the female class. The students were told to complete the questionnaire on the same day. This questionnaire measures six aspects of critical thinking skills including (a) interpretation, (b) analysis, (c) inference, (d) evaluation, (e) explanation, and (f) self-regulation.

I distributed the paper to 35 students and I interviewed 15 students out of 35 students. There is no gap in both data, interview and critical thinking questions. During the interview most of students stated that they got scientific knowledge in biology class which allows them to answer the critical thinking questions correctly. According to the interview, they are familiar with group discussion and solving problems questions, it proved by the way they answer the questions, they are able to answer in order and express it well.

Table 2
Critical thinking support and attributes.

CODE	DESCRIPTION
Content	Promoting critical thinking by imbibing critical thinking approach in curriculum such as connecting the topics in daily life, giving analytical questions often, stimulating curiosity and letting students explore.
Humility	Students tend to discuss and share perspectives with peers
Curiosity	Students had researhed issues in a group and they are actively involved in discussion.
Investigation	When teacher give them case/problem, they tend to seek information to solve the problem.
Creativity	Students can apply scientific methods in everyday life
Active listening	Students communicate and critique ideas with peers
Recognize relevant sources	Students know how to find relevant and reliable sources

Table 2 shows that the students have critical thinking skills attributes and the school provide as well as support them to build that skills so that they have a quality of teaching learning process. The results of this study were consistent with Luciano, 2014 and Santos, 2019 studies, which indicated that customizing the content of the curriculum as well as nurturing an extensive approach to critical thinking in the curriculum was essential in terms of supporting the advancement of students to become highly informed and mindful of circumstances, intelligent, and caring for others.

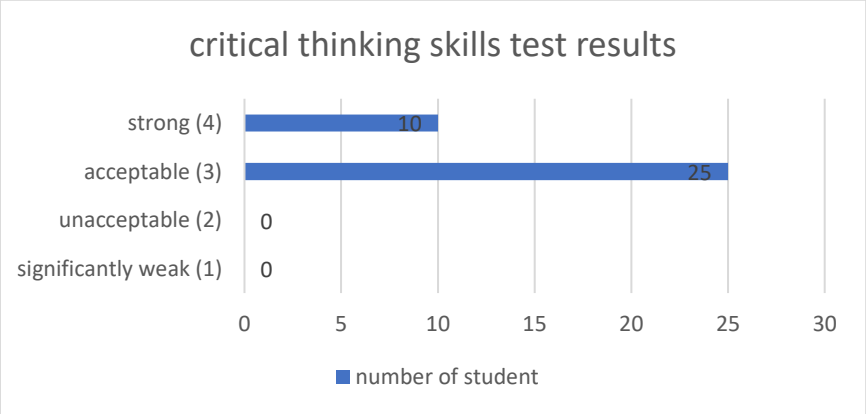

Chart 1 Critical thinking skills results

Chart 4.1 shows the results of critical thinking test which filled by 35 students. This result gotten from raw data that already analyzed using *Microsoft Office Excel*. This chart present that the students' scores on the questionnaire varied from 3 to 4 points on every indicator. Students scored four when they were able to interpret, analyze, infer, evaluate, explain, and do self-regulation consistently. 25 students were accurately interpreted statements and questions consistently while 10 students were able to interpret statements and questions quite accurately. Based on observation and interview, these results can be obtained because of the school and teacher support on fostering critical thinking skills of students. This statement is consistent with Santos (2019) and Luciano (2014) studies, which indicated that customizing the content of the curriculum as well as nurturing an extensive approach to critical thinking in the curriculum was essential in terms of supporting the advancement of students to become highly informed and mindful of circumstances, intelligent, and caring for others.

According to interviews that have been conducted, this school promoted critical thinking by integrating it into the curriculum especially biology course. Biology teacher said that she promoted critical thinking in teaching-learning activities by using non-threatening and active learning. Teacher was challenging students by asking several higher-order thinking questions while delivering the topics and after her students presenting their work as feedback. Various studies stipulated that curriculum quality has an impact on students' achievement (skills and knowledge) as well as attributes (Alghamdi, 2017; Andrietti & Su, 2019; Luciano, 2014). Curriculum coordinator and biology teacher were putting critical thinking skills to the curriculum as an expected outcome. The results of this study were consistent with Luciano (2014) and Santos (2019) studies, which indicated that customizing the content of the curriculum as well as nurturing an extensive approach to critical thinking in the curriculum was essential in terms of sustaining the advancement of students to become highly informed and mindful of circumstances, intelligent, and caring for others.

Active teaching-learning activities were carried out to foster critical thinking skills of students, including group discussion, research project, presentation, review YouTube videos and share perspectives (analyzing other people's work). Students could bring issues that bother him/her to the class, so he/she can discuss it with peers and teacher. According to the observations, the teacher was always starting the questions with 'why', which means that the teacher was trying to stimulate students' curiosity that leads to critical thinking. Methods that teacher use to boost critical thinking skills coincide to what literature says. Studies, such as Abrami et al. (2015); Arslan, Gulveren, & Aydin (2014); Bezanilla, Fernández-Nogueira, Poblete, & Galindo-Domínguez (2019); Halpern (2014); Smolarek & Hora (2016), show that the effective methodologies that teachers can use to advance critical thinking skills are questioning, problem solving (problem and project based learning), collaborative and cooperative learning, case study, oral and written communication, and connection with the real world. Collaborative and cooperative activities that can be conducted were creating posters, discussion and contribution oral argumentation. Problem-solving methods could be applied by engaging students to do research project about a real issue including global issue and everyday issue, pairwork to find solutions, solving vague circumstances set in advance, and review the media (YouTube videos). Case study methodology could be conducted by engaging students to decipher the case and following analysis while oral communication conducted by involving presentations given by students. Teachers can bring real-world activities by engaging students to link situations with their own experience. Given classwork is also take into account in nurturing the critical thinking skills of students.

Figure 2. Classwork in Blood and Lymph topics.

5. (a) Distinguish tissue fluid from lymph (2 marks)

   (b) Briefly describe the formation of lymph (3 marks)

   (c) Describe how lymph is returned to the blood stream (4 marks)

Figure 3 Classwork in structure to function: plants topic.

2. The table shows the destination (sink) of translocated carbohydrates in a mature tomato plant.

Destination	% of total translocated carbohydrate
Roots	26
Stem	22
Leaves	12
Tomatoes	40

(a) Suggest an explanation for the percentage of carbohydrate translocated to the tomatoes. **3**

(b) Outline how phloem tissue is structurally adapted for its role in carbohydrate transport. **3**

Figure 2 shows that teacher imbibing aspects of critical thinking skills in classwork. Explanation aspect of critical thinking is represented by the point (a) to (c). Students can not solve the questions directly if they do not understand the concept and just remembering things, but they need to solve the questions thoughtfully. Students can have good marks in the explanation aspect if they are able to justify the key results and procedures, as well as explain assumptions and reasons. Figure 3 shows the representation of analysis and inference aspects of critical thinking. In analysis aspect students are required to identify the most important arguments pro and cons, while inference aspects required students to thoughtfully analyze and evaluate major auxiliary points of view. Giving a higher-order thinking task is also an approach in encouraging critical thinking skills as stated in Bezanilla et al. (2019) and Halpern (2014).

Student interview results also show that the students have characteristics of strong critical thinkers. Referring to learning activities observations, students showed strong critical thinking skills. Actively involve in group discussion, communicate and critique ideas with others support analysis, inference, explanation, and evaluation aspects of critical thinking skills. Self-regulation aspect was supported by students' ability to recognize relevant, appropriate, and reliable sources. Halpern (2014) and Cottrell (2017, p. 2) emphasized that critical thinkers have characteristics including: (a) reasons rationally and well, (b) reads considerably, (c) open minded, (d) reads with high understanding, (e) reflecting on issues logically, (f) drawing valid conclusions, (g) synthesizing information, and (h) weighing up evidence justly.

CONCLUSION

Cambridge International Curriculum Biology in Semesta High School was highly implemented and well managed by this school showed by the quality of provided features, annual plan content, and the methodology of teaching-learning activities. This excellent implementation of Cambridge International Curriculum in Semesta High School had a great impact on students' critical thinking skills showed by high results on critical thinking questionnaire, students interview results and learning activities observations.

REFERENCES

Abrami, P. C., Bernard, R. M., Borokhovski, E., Waddington, D. I., Wade, C. A., & Persson, T. (2015). Strategies for Teaching Students to Think Critically: A Meta-Analysis. *Review of Educational Research*, *85*(2), 275–314. https://doi.org/10.3102/0034654314551063

Alghamdi, A. K. H. (2017). The effects of an integrated curriculum on student achievement in Saudi Arabia. *Eurasia Journal of Mathematics, Science and Technology Education*, *13*(9), 6079–6100. https://doi.org/10.12973/eurasia.2017.01051a

Andrietti, V., & Su, X. (2019). Education curriculum and student achievement: theory and evidence. *Education Economics*,

27(1), 4–19. https://doi.org/10.1080/09645292.2018.1527894

Argaw, B. A., & Puhani, P. A. (2018). Does class size matter for school tracking outcomes after elementary school? Quasi-experimental evidence using administrative panel data from Germany. *Economics of Education Review*, *65*, 48–57. https://doi.org/10.1016/j.econedurev.2018.06.005

Arslan, R., Gulveren, H., & Aydin, E. (2014). A Research on Critical Thinking Tendencies and Factors that Affect Critical Thinking of Higher Education Students. *International Journal of Business and Management*, *9*(5), 43–59. https://doi.org/10.5539/ijbm.v9n5p43

Bezanilla, M. J., Fernández-Nogueira, D., Poblete, M., & Galindo-Domínguez, H. (2019). Methodologies for teaching-learning critical thinking in higher education: The teacher's view. *Thinking Skills and Creativity*, *33*(February), 100584. https://doi.org/10.1016/j.tsc.2019.100584

Butterworth, J., & Thwaites, G. (2013). *Critical Thinking and Problem Solving Thinking Skills Thinking Skills Critical Thinking and Problem Solving Second edition* (2nd ed.). Cambridge: Cambridge University Press.

Cottrell, S. (2017). *Critical Thinking Skills: Effective Analysis, Argument and Reflection (Macmillan Study Skills)* (3rd ed.). Melbourne: Red Globe Press.

Cresswell, J. W. (2012). *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research* (4th ed.). Boston: Pearson Education.

Crowe, S., Cresswell, K., Robertson, A., Huby, G., Avery, A., & Sheikh, A. (2011). The case study approach. *BMC Medical Research Methodology*, *11*(1), 100. https://doi.org/10.1186/1471-2288-11-100

Elizabeth, M. (2014). *Implementasi kurikulum internasional cambridge dan dampaknya terhadap pengelolaan pembelajaran biologi: studi kasus di saint john's catholic school semarang* (Universitas Negeri Semarang). Retrieved from https://lib.unnes.ac.id/23076/

Elwy, A. R., Wasan, A. D., Gilman, A. G., Johnston, K. L., Dodds, N., McFarland, C., & Greco, C. M. (2019). Using formative evaluation methods to improve clinical implementation efforts: Description and an example. *Psychiatry Research*, (April), 112532. https://doi.org/10.1016/j.psychres.2019.112532

Evans, C. (2013). Making Sense of Assessment Feedback in Higher Education. *Review of Educational Research*, *83*(1), 70–120. https://doi.org/10.3102/0034654312474350

Facione, P. A., & Carlin, G. (2015). 2007 Update Critical Thinking : What It Is and Why It Counts. In *Thinking*. Retrieved from https://www.researchgate.net/publication/251303244_Critical_Thinking_What_It_Is_and_Why_It_Counts

Fisher, D., Frey, N., & Nelson, J. (2012). Literacy achievement through sustained professional development. *Reading Teacher*, *65*(8), 551–563. https://doi.org/10.1002/TRTR.01082

Francis, J., & Barnett, W. S. (2019). Relating preschool class size to classroom quality and student achievement. *Early Childhood Research Quarterly*, *49*, 49–58. https://doi.org/10.1016/j.ecresq.2019.05.002

Haelermans, C. (2017). *Digital Tools in Education. On Usage, Effects and the Role of the Teacher*. Retrieved from https://www.sns.se/wp-content/uploads/2017/10/digital-tools-in-education.pdf

Halpern, D. F. (2014). Thought and Knowledge: An Introduction to Critical Thinking (Thought & Knowledge: An Introduction to Critical Thinking). In *Experimental Psychology* (5th ed., Vol. 52). Retrieved from http://www.amazon.com/Thought-Knowledge-Introduction-Critical-Thinking/dp/0805839666

Kalinowski, E., Egert, F., Gronostaj, A., & Vock, M. (2019). Professional development on fostering students' academic language proficiency across the curriculum—A meta-analysis of its impact on teachers' cognition and teaching practices. *Teaching and Teacher Education*, *88*, 102971. https://doi.org/10.1016/j.tate.2019.102971

Keumala, Y. (2013). *Implementation of cambridge international general certificate of secondary education curriculum in plant transport system topic in an international school*. Indonesia University of Education.

Kleberg, J. R. (2016). Quality Learning Environment. Retrieved December 7, 2019, from https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=2ahUKEwjr0ou306LmAhVMAHIKHQzXBpcQFjABegQICBAC&url=https%3A%2F%2Fei-ie.org%2Fmedia_gallery%2FPolicybrief_01_environment_eng.pdf&usg=AOvVaw0eJYLkBQRjclTlxiXCKlJ1

Lin, Y. (2018). Developing Critical Thinking in EFL Classes. In *Developing Critical Thinking in EFL Classes*. https://doi.org/10.1007/978-981-10-7784-5

Luciano, J. (2014). The Influence of Curriculum Quality on Student Achievement on the New Jersey Assessment of Skills and Knowledge (NJ ASK) Language Arts and Mathematics for Fifth-Grade Students in the Lowest Socioeconomic School Districts. *ProQuest Dissertations and Theses*, (2014), 243. Retrieved from https://search.proquest.com/docview/1658785154?accountid=13042%0Ahttp://oxfordsfx.hosted.exlibrisgroup.com/oxford?url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:dissertation&genre=dissertations+%26+theses&sid=ProQ:Education+Database&atitle=&title=Th

Ministry of Education and Culture of the Republic of Indonesia. *Regulation of cooperation in the management of education by foreign educational institutions with educational institutions in Indonesia*. , Pub. L. No. 31, 1 (2014).

Nottingham, J. (2017). *The learning challenge: how to guide your students through the learning pit to achieve deeper understanding*. Thousand Oaks: Corwin.

OECD. (2017). *PISA 2015 Results (Volume III)*. https://doi.org/10.1787/9789264273856-en

Pearson. (2019). Six Characteristics of Strong Critical Thinkers. Retrieved December 29, 2019, from TalentLens website: https://www.talentlens.co.uk/insight/six-characteristics-of-strong-critical-thinkers/

Santos, L. F. (2019). CRITICAL THINKING PERSPECTIVES ACROSS CONTEXTS AND CURRICULA: Dominant, neglected, and complementing dimensions. *Thinking Skills and Creativity*, 100610. https://doi.org/10.1016/j.tsc.2019.100610

Shaari, M. F., & Ahmad, S. S. (2016). Physical Learning Environment: Impact on Children School Readiness in Malaysian Preschools. *Procedia - Social and Behavioral Sciences*, *222*, 9–18. https://doi.org/10.1016/j.sbspro.2016.05.164

Shi, M. (2019). The effects of class size and instructional technology on student learning performance. *International Journal of Management Education*, *17*(1), 130–138. https://doi.org/10.1016/j.ijme.2019.01.004

Smolarek, B. B., & Hora, M. T. (2016). *Examining How Faculty Reflect on Instructional Data: A Call for Critical Awareness and Institutional Support. WCER Working Paper No. 2016-4*. 26. Retrieved from https://search.proquest.com/docview/2023998857?accountid=10957

Stobie Tristian. (2019). Implementing the curriculum with cambridge: a guide for school leaders. In *Cambridge International Examination* (2019th ed.). Retrieved from https://www.cambridgeinternational.org/support-and-training-for-schools/teaching-cambridge-at-your-school/implementing-the-curriculum-with-cambridge/

Torralba, K. D., & Doo, L. (2019). Active Learning Strategies to Improve Progression from Knowledge to Action. *Rheumatic Disease Clinics of North America*, *46*(1), 1–19. https://doi.org/10.1016/j.rdc.2019.09.001

UCLES. (2018). International curriculum. Retrieved July 1, 2019, from https://www.cambridgeinternational.org/why-choose-us/benefits-of-a-cambridge-education/international-curriculum/

Vermunt, J. D., Vrikki, M., van Halem, N., Warwick, P., & Mercer, N. (2019). The impact of Lesson Study professional development on the quality of teacher learning. *Teaching and Teacher Education*, *81*, 61–73. https://doi.org/10.1016/j.tate.2019.02.009

Vihman, V.-A. (2018). Language: everybody's talking (about) it. *The Role of Language in International Education*, 127–138. https://doi.org/10.4324/9781351232753-9