Profile of Computational Thinking Skills in Environmental Chemistry Courses for Prospective Science Teacher Students

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Sections Info	ABSTRACT
Article history: Submitted: April 30, 2022 Final Revised: May 25, 2022 Accepted: May 26, 2022 Published: May 29, 2022 *Keywords:* Computational thinking Environmental chemistry course Field study	Computational thinking skills are not only provided to students in computer-related courses, but also in all courses, including Environmental Chemistry courses. Environmental chemistry courses are considered important because they orient students to the achievement of scientific literacy and awareness. Therefore, optimization of learning in environmental chemistry courses also needs to be carried out to support the achievement of CPL which includes 21st century life skills, including computational thinking skills. science teacher candidates. The research method follows 3 stages of field study, namely preparation, data collection, and data analysis. The results of the study show that the Science Education Study Program has poured CT skills into CPL, environmental chemistry lectures are still dominated by theoretical explanations by lecturers, lecturers do not understand the concept of CT, and CT skills are very important to provide students.

INTRODUCTION

The development of science and technology that has occurred during the last decade is very fast. Globalization that has hit the whole world in the 21st century has caused the goal of national education to no longer only educate the nation and liberate humans, but shifts towards education as a commodity because it emphasizes the mastery of Science, Technology, and Arts which are pragmatic and materialist (Junaedi, 2020). As a result, the educational curriculum must also be revised according to the needs and objectives of the national education itself, including the higher education curriculum. In a period of 6 years, the National Standard for Higher Education (SN-Dikti) has undergone three changes, namely from Permenristekdikti No. 49 of 2014 changed to Permenristekdikti No. 44 of 2015, and the last to Permendikbud No. 03 of 2020 in line with the policy of the Ministry of Education and Culture regarding Independent Learning-Independent Campuses (i.e. MBKM) (Junaedi, 2020).

The change in SN-Dikti is certainly a challenge for universities to produce graduates who have data literacy skills, technology, and noble character, which supports graduates to be accepted by society and the world of work in the Industrial 4.0 era. In National Standards of Higher Education (SN-Dikti) as stated in Minister of Education and Culture Regulation Number 3 of 2020 (Kemendikbud RI, 2020), students are oriented to acquire 21st century skills, including communication, collaboration, critical thinking, creative thinking, computational logic, and caring. To equip these skills, study programs at universities are not only required to revise and adjust the curriculum and Program Learning Outcomes (CPL), but also improve patterns, approaches, and strategies in lectures.

One of the focuses of the revision of the MBKM curriculum is to accommodate computational thinking skills as one of the 21st century life skills that college graduates must possess. Computational thinking is a skill that is expected to be able to answer

global challenges in the 21st century. Computational thinking is a thinking process in problem formulation and solutions so that the solutions are represented in an effective form by information processing agents. Barr & Conery, (2011) revealed that computational thinking involves problem-solving skills and certain dispositions, such as self-confidence and persistence, when faced with certain problems. Moon et al. (2020) defines CT as a learner's ability to approach unstructured tasks systematically based on algorithmic thinking in computing. Moon et al. (2020) discusses the six aspects of CT, namely decomposition, abstraction, algorithms, debugging, iteration, and generalization. But Wing (2006) concludes five cognitive processes in computational thinking with the aim of solving problems efficiently and creatively, namely (1) problem reformulation; (2) recursion; (3) problem decomposition; (4) abstraction; and (5) systematic testing. Other researchers say that computational thinking will help individuals to solve complex general problems through the stages of decomposition, pattern recognition, abstraction, and algorithm design (Hunsaker, 2020).

Computational thinking skills are not only provided to students in computer-related courses, but also in all courses. This is because the debriefing for students is centered on computational thinking process skills, through two approaches, namely a computer (plugged) or without a computer (unplugged) (Chongo et al., 2021). Hemmendinger calls computational thinking useful for teaching students how to think to understand how to use computing to solve problems. Of course this is not in computer science courses but is also meaningful in other sciences, including chemistry (Kraska, 2020). Peel also stated a similar statement that computational thinking can be applied to other disciplines and provides benefits for everyday life (Peel et al., 2021). In addition, computational thinking skills are important to be provided to students because they are in line with many aspects of 21st century competencies such as creativity, critical thinking, and problem solving (Ananiadou & Claro, 2009; Binkley et al., 2012 in (Anistyasari et al., 2020).

One of the subjects in the curriculum of the Bachelor Science Education Study Program at Bengkulu University is environmental chemistry. This course is in the 2018 curriculum and the 2020 MBKM curriculum. Environmental chemistry courses are considered important because they orient students to the achievement of scientific literacy and awareness. Therefore, optimizing learning in environmental chemistry courses also needs to be done to support the achievement of CPL which includes 21st century life skills, including computational thinking skills. Optimizing the learning of environmental chemistry courses is also to achieve the vision and mission of the S1 Science Education Study Program which leads to the character of graduates with a conservation perspective.

Future learning of environmental chemistry courses is directed at the combination of the use of internet networks and computing capabilities (Internet of Things) which allows learning to be more effective and efficient for student learning outcomes (Junaedi, 2020). To optimize the learning of environmental chemistry, both in terms of approaches, models, strategies, methods, or evaluations, which are oriented to computational thinking skills, it is necessary to analyze the needs of lectures through field study. The results of this field study are expected to be used as initial studies in developing the design of learning programs in order to optimize the environmental chemistry lecture process in an effort to equip students with computational thinking skills as one of the 21st century life skills that must be possessed.

RESEARCH METHODS
Participants
This research was conducted at the Science Education Study Program, one of the universities in Bengkulu Province. The research involved 1 lecturer in environmental chemistry courses, 1 Quality Control Group (i.e. GKM), and 37 students from the 2018 and 2019 batches who had attended environmental chemistry lectures.

Instruments and Procedures
The research carried out includes 4 stages, namely preparation, data collection, data analysis, and report writing. The preparation stage includes identifying the locus and focus of the field study to be explored, identifying the required documents, and preparing instruments in the form of interview guidelines and questionnaires. Data collection was carried out by requesting the 2018 Curriculum Book and the 2020 Curriculum Design (i.e. MBKM) from the GKM, Semester Learning Plans (i.e. RPS) and environmental chemistry course exam questions from the supervisor, and distributing student response questionnaires. The last stage is data analysis which includes curriculum analysis, Semester Learning Plans (i.e. RPS) analysis with reference to SN-Dikti, and description of interview results which consist of transcription and coding. In addition, data analysis also includes data processing from the questionnaire results with Likert scale conversion.

Data Analysis
The documents obtained were analyzed descriptively qualitatively to answer the problems in this field study. Meanwhile, the data from the questionnaires were analyzed qualitatively and quantitatively. The criteria used to measure the results of student responses or responses to environmental chemistry lectures is the Likert scale which consists of 4 rating scales. The data were then analyzed to determine the categories that were developed based on student assessments. Data analysis of student responses to environmental chemistry studies refers to the conversion of quantitative data to qualitative data. The data from the interviews were analyzed descriptively qualitatively with deductive coding techniques.

RESULT AND DISCUSSION
Science Education Study Program Curriculum Documents
Based on the 2018 and 2020 Science Education Study Program curriculum documents, the profile of the study program graduates is given in **Table 1.**

Table 1. Profile of graduates and their descriptions.

Code	Profile of graduates	Description
PL1	Science teacher candidates	Having competence as a science educator who is religious, nationally minded, professional, independent, local and environmental wisdom, creative, innovative, understanding students and ways learning, have basic science learning abilities. Understand science, be able to develop professionalism in science education, be able to design and use learning media in accordance with the development of information technology and science.
PL2	Science education researcher	Have competence as a novice researcher who able to contribute in solving problems in science education, especially in the field

Code	Profile of graduates	Description
PL3	Educational Institution/Unit Manager	of conservation-oriented education, and able to communicate the results of his research in scientific forums. Having a professional attitude as a manager who is able to develop scientific concepts of science or science education is an opportunity for managers of educational institutions/units either independently or in groups, products or services.

To meet the graduate profile criteria, the Science Education Study Program formulates a program learning outcomes (CPL) in accordance with the Indonesian national qualification framework (KKNI). In the CPL, the Science Education Study Program has accommodated the need for computational thinking skills in the knowledge aspect (P2), namely mastering the concepts, principles, and applications of statistics, computing, electronics, and languages to support the science learning process.

Table 2. Program learning outcomes (CPL).

Program learning outcomes (CPL)	
Attitude	
S1	• Fear of God Almighty and able to show a religious attitude.
S2	• Upholding human values in carrying out their duties based on religion, morals, and ethics.
S3	• Contribute to improving the quality of life in society, nation, state, and the advancement of civilization based on Pancasila.
S4	• To act as citizens who are proud and love their homeland, have nationalism and a sense of responsibility to the state and nation.
S5	• Appreciate the diversity of cultures, views, religions and beliefs, as well as the opinions or original findings of others.
S6	• Cooperate and have social sensitivity and concern for society and the environment.
S7	• Obey the law and discipline in social and state life.
S8	• Internalize academic values, norms, and ethics.
S9	• Demonstrate a responsible attitude towards work in their area of expertise independently.
S10	• Internalize the spirit of independence, struggle, and entrepreneurship.
S11	• Scientific, educative and religious attitude and behavior, as well as compassion, honing, fostering in a work environment and social life that have global competitive and comparative advantages.
General Skills	
KU1	• Able to apply logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and applies humanities values in accordance with their field of expertise.
KU2	• Able to demonstrate independent, quality, and measurable performance.

Program learning outcomes (CPL)

KU3
- Able to study the implications of the development or implementation of science and technology that pays attention to and applies humanities values according to their expertise based on scientific principles, procedures and ethics in order to produce solutions, ideas, designs or art criticism.

KU4
- Able to compile a scientific description of the results of the studies mentioned above in the form of a thesis or final project report, and upload it on the university's website.

KU5
- Able to make appropriate decisions in the context of solving problems in their area of expertise, based on the results of analysis of information and data.

KU6
- Able to maintain and develop a network with supervisors, colleagues, colleagues both inside and outside the institution.

KU7
- Capable of being responsible for the achievement of group work results and supervising and evaluating the completion of work assigned to workers under their responsibility.

KU8
- Able to carry out the process of self-evaluation of the work group under their responsibility, and able to manage learning independently.

KU9
- Able to document, store, secure, and retrieve data to ensure validity and prevent plagiarism.

Special Skills

KK1
- Able to make science learning tools using scientific principles and principles of instructional design through independent analysis of subject matter (pedagogical content knowledge) in accordance with the applicable curriculum, principles of instructional design, scientific approach, utilizing science and technology, and the natural environment, and implementing Science learning is in accordance with the characteristics of the material and the characteristics of students in order to be able to develop thinking skills and scientific attitudes.

KK2
- Able to analyze problems, find sources of problems, solve problems in the science learning process and science laboratory management problems in accordance with scientific principles of science and propose various alternative solutions to problems and conclude them for making the right decisions and become lifelong learners who are more independent and able to adapt to the dynamic changes of the times.

KK3
- Able to conduct reflective analysis of learning to improve the quality of science learning, conduct research with quantitative and/or qualitative approaches to solve science learning problems, review research results and make reports on research results in the form of scientific articles for publication.

Program learning outcomes (CPL)	
Knowledge	
P1	• Mastering science concepts, principles, laws and theories.
P2	• Mastering the concepts, principles, and applications of statistics, computing, electronics, and languages to support the science learning process.
P3	• Mastering learning theory, science curriculum and learning concepts, science learning methods and strategies, science learning planning, development of teaching materials, media and science learning assessment and development of science laboratory tools for schools.
P4	• Mastering science education research methodology, laboratory management for science learning and the concept of entrepreneurship.

The results of the analysis of curriculum documents show that the curriculum in the Science Education Study Program at a state university in Bengkulu Province has accommodated computational thinking (CT) skills. This can be seen in the formulation of graduate learning achievement (see Table 7), where the Science Education Study Program has accommodated the need for computational thinking skills in the knowledge aspect (P2), namely mastering the concepts, principles, and applications of statistics, computing, electronics, and languages to support science learning process. To support the development of computational thinking (CT) in students, the Science Education Study Program requires all students to take coding and ICT courses. In addition, ICT-based learning media courses are also available.

The existence of computational thinking in CPL is intended so that students are able to solve real-life problems by utilizing computational thinking steps. Denning (2017), defines computational thinking as the thought process involved in formulating a problem so that the solution is represented as computational steps and algorithms that can be carried out effectively by the information agent process. Computational Thinking is done on the human side, so it can be used in various fields, not only in the world of computer science. Here, computational thinking also sharpens logical, mathematical, mechanical knowledge combined with modern knowledge about technology, digitization, and computerization and even forms a confident, open-minded, tolerant and sensitive character to the environment (Kalelioğlu, 2018).

Semester Learning Plan (RPS) Document
Semester Learning Plans (RPS) were analyzed to map the relationship between Program Learning Outcomes (CPL), Course Learning Outcomes (CPMK), and Sub-CPMK with learning models/strategies/methods and media teaching materials used by lecturers in environmental chemistry courses. RPS analysis refers to the provisions of SN-Dikti listed in Permenristekdikti N0. 44/ 2015 which states that the learning process is based on RPS, which is prepared for each subject. RPS must contain:
➢ The name of the study program, the name and code of the course, semester, credits, the name of the supporting lecturer; graduate learning achievements charged to the course;
➢ Program learning outcomes charged to courses;

- ➢ Planned final capabilities at each stage of learning to meet graduate learning outcomes;
- ➢ Study materials related to the capabilities to be achieved;
- ➢ Learning methods;
- ➢ The time provided to achieve the ability at each stage of learning;
- ➢ Student learning experience embodied in the description of tasks that must be done by students for one semester;
- ➢ Criteria, indicators, and assessment weights; and
- ➢ List of references used.

Based on the above provisions, the RPS compiled by the lecturer in environmental chemistry courses has fulfilled all the elements of the completeness of the RPS. However, the relationship between CPL and CPMK is still unclear. The Semester Learning Plan (RPS) document developed by a lecturer in environmental chemistry also shows the content of computational thinking in accordance with CPL. Where, the lecture process has led to student centered learning (SCL) with problem or case solving methods. A good lesson plan according to Schunk (2012) is one that reflects a step-by-step learning activity plan to achieve learning outcomes. Good learning activities carried out by lecturers and students should be reflected in the lesson plans.

Question Documents and The Results of Lecturer Interviews Related to Computational Thinking (CT) Knowledge

The documents analyzed in this field study are the Mid-Semester Examination and Final Semester Examination. The following is the result of the analysis of the document.

Table 3. Studying environmental chemistry mid-semester examination questions.

Question Number	Questions material	CT Elements	Description
1	Air pollution	Decomposition	Sorting out household appliances that contain ozone-depleting substances
		Algorithm	Create mechanism for ozone depletion
2	Air pollution	Decomposition	Sorting out the types of air pollutants
		Pattern recognition	The relationship between acid rain and air pollution and its impact on human survival
3	Environmental toxicology	Decomposition	The use of pesticides on vegetable crops associated with environmental toxicology
		Algoritm	Preventive measures against toxic effects
4	Hydrological cycle	Decomposition	Elements in the hydrological process
		Pattern recognition	Hydrological cycle
		Abstraction	The possibility of acid rain in areas far from industry
5	Water pollution	Decomposition	Elements in the analysis of OD, BOD, COD
		Abstraction	The magnitude of the impact of

Question Number	Questions material	CT Elements	Description
			water pollution

Table 4. Studying environmental chemistry final-semester examination questions.

Question Number	Questions material	CT Elements	Description
1	Soil pollution	Decomposition	Sorting out human activities that cause soil pollution
2	Management of B3 waste types	Decomposition	Analysis of B3 waste types
3		Algorithm	Steps to overcome B3 waste pollution
4		Pattern recognition	The impact of B3 waste pollution
5	Bioremediation	Algorithm	Bioremediation process
		Decomposition	Comparison of waste treatment between bioremediation and chemicals

The results of interviews with lecturers who teach environmental chemistry courses related to their knowledge of computational thinking skills were analyzed using deductive coding techniques. According to Bandur (2016) The coding process is an interactive process for compiling data categorization based on concepts that emerge from the data, then without deleting all data categories and concepts that have a relationship with each other. Table 5 is an analysis of the results of interviews with lecturers in environmental chemistry courses.

Table 5. Results of interviews with lecturers in environmental chemistry courses.

Code	Indicator	Result
CT-1	Knowledge of CT	Familiar with CT terms since 2020, but doesn't know in detail the pillar or elements in CT
		Defines CT as a technique of solving problems by utilizing computer science or IT
		The most difficult of CT elements is abstraction
CT-2	Implementation of CT	The lecturer has never applied CT in courses because of the lack of understanding of the lecturer about CT and the unpreparedness of students in participating in CT-based lectures
CT-3	Supporting facilities	Supporting facilities are needed in the form of a laptop with high RAM to apply CT, this is what makes CT cannot be applied in lectures
CT-4	The need for CT	CT is very important to apply because it is very much needed by students in solving problems and making decisions
		Lecturers also need training related to CT in order to be able to implement it in learning

The results of the document analysis of exam questions compiled by the lecturers show that in fact the lecturers have included elements of computational thinking (CT), namely decomposition, abstraction, pattern recognition, and algorithms. The main keywords in computational thinking skills are abstraction, decomposition, pattern

recognition, algorithms, logical thinking, and evaluation (Yusoff et al., 2021). Interestingly, during the interview, the lecturer in the environmental chemistry course said that he did not include CT elements in the questions because he had not implemented CT in lectures. This shows that the lecturer does not fully understand the concept of computational thinking (CT). Even so, the lecturer in environmental chemistry courses admits that computational thinking (CT) is very important to be developed for students to be able to solve problems both in learning and in real life. Computational thinking is an important skill that needs to be possessed in addition to the ability to read, write, and calculation arithmetic (Zhong et al., 2016). This shows that computational thinking is a fundamental ability that everyone needs to learn and use. Computational thinking is also an universal skill that can foster the learning of subjects and several soft skills (León et al., 2018).

Results of Lecturer Interviews Related to The Environmental Chemistry Lecture Process

Lecturer interviews related to the environmental chemistry lecture process were conducted to determine the implementation of lectures, models/strategies/methods and learning media used. Based on the results of the interview, the lecturer conveyed that environmental chemistry courses were carried out in 3rd semester which was dominated by theoretical explanations and a little discussion. During the discussion, students were quite active in asking and answering questions. Lecture evaluation measures understanding of concepts, skills, and attitudes. Among them measure critical thinking skills and science process skills. The obstacle in lectures is that there are several materials that must be focused on the field but cannot be implemented because learning is carried out online.

For the implementation of CT in lectures, lecturers and students have used computational thinking steps in solving problems but not completely. Lectures themselves are admittedly not effective in facilitating the development of computational thinking skills. It is because the lecturers have not fully mastered the concept of CT. Whereas, computational thinking skills are very useful for students in answering questions through computational steps so they need to be trained for students.

The Results of Interviews with the Quality Control Group (GKM)

The interview with Quality Control Group (GKM) was intended to determine the implementation of the environmental chemistry lecture process and the completeness of the learning tools. Interviews were conducted in a structured manner with reference to the interview guidelines. **Table 6** shows the results of interviews with GKM.

Table 6. The result of interviews with Quality Control Group (GKM).

Code	Indicator	Result
P1	Environmental chemistry course	- Environmental chemistry is offered to students in semester 3 - Lectures are considered to have gone well
P2	Semester Learning Plans (RPS)	- RPS is in accordance with SNPT - Graduate learning outcomes and course learning outcomes have led to CT skills but haven't been clearly stated in the RPS
P3	Supporting	Facilities and infrastructure at university have

| Code	Indicator	Result
	facilities	facilitated environmental chemistry courses
P4	Computational thinking (CT)	- Evaluation questions made by lecturers have not accommodated computational thinking skills - Computational thinking skills need to be trained for students - Lecturers need to take CT training on campus internally - CT training time for lecturers is effective for 3 days

The results of the interview with the Quality Control Group (GKM) stated that environmental chemistry lectures had been going well and were quite effective. Learning tools developed by lecturers have accommodated CPL, but have not accommodated computational thinking skills. This is because the lecturers themselves do not understand the concept of computational thinking (CT). For this reason, lecturers need to attend training on computational thinking (CT) within the university for 3 days to equip lecturers with computational thinking (CT) abilities. This statement is in line with Ngoc et al., (2020), that the professional development of lecturers plays an important role in improving the quality of teaching. The implication from it, is the application of computational thinking (CT) in lectures.

Questionnaire Analysis Results

Questionnaires were distributed to students of the Science Education Study Program who had attended environmental chemistry lectures. The questionnaire contains 30 question items involving 39 students. Questionnaire data were analyzed using a Likert scale for a rating scale of 4. According to Sugiyono (2015), Likert scale is used to measure attitudes, opinions and perceptions of a person or group of people about social phenomena.The following are the results of the questionnaire analysis. The summary of the results of the questionnaire analysis of student responses to each statement indicator is presented in the Figure 1.

Table 7. Questionnaire analysis of students reponses.

Criteria	Interval	Frequency
Strongly agree	$81,25\% < P \leq 100\%$	8
Agree	$62,5\% < P \leq 81,25\%$	31
Dont't agree	$43,75\% < P \leq 62,5\%$	0
Strongly disagree	$25\% < P \leq 43,75\%$	0
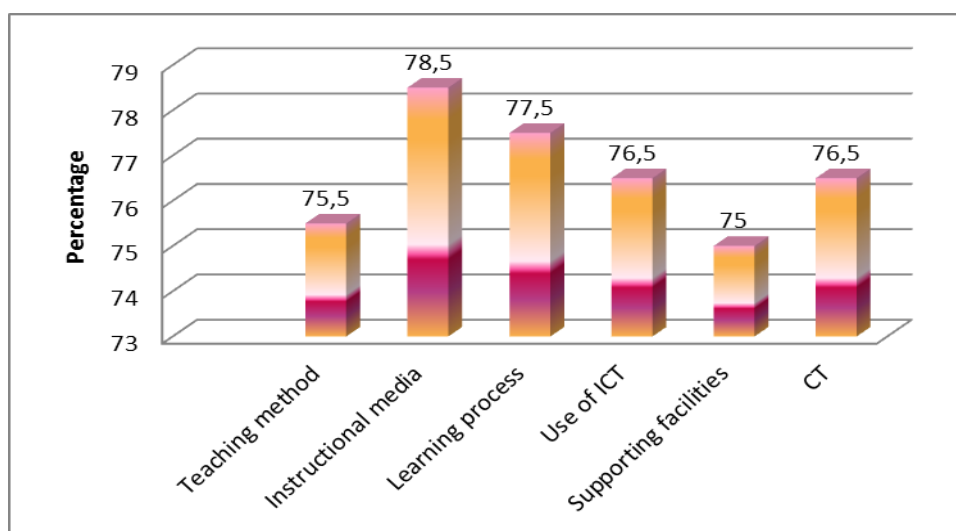
Figure 1. The results of the questionnaire analysis of student responses.

The results of the descriptive analysis related to the percentage of the mean value of each indicator on the student response questionnaire related to lectures showed that 77.01% of respondents agreed with the environmental chemistry lectures that had been carried out. This means that students assume that lectures have been effective in equipping them with life skills. The highest percentage is indicated by indicators of learning media used by lecturers, which is 78.5%. Students admit that lecturers have used ICT-based learning media and varied. However, a small number of students still feel that environmental chemistry lectures are boring because they are dominated by lecturers and the learning methods and media are monotonous. It was also acknowledged by the lecturer in the interview that the lecture was dominated by theoretical explanations by the lecturer and little discussion. The result is that students become bored and passive in learning activities (Rizki & Putra, 2019; Mulyani, 2016). For that we also need learning media that are fun and have challenges, such as educational games. Educational game applications aim to provoke student interest in learning so that they can more easily understand the lecture material presented. Educational Game is a game that integrates and combines subject matter into the components of the game (Riva, 2012). According to Cahyo (2011) a game is said to be educational if the game can utilize and hone the ability of the left brain function as it should. The implementation of educational games in the world of education stems from the very rapid development of video games, making them an alternative media in learning activities (Yakin et al., 2018). A research result Lutfi et al., (2019) shows that students dominate activities during chemistry learning using computer-based games, students are also interested in playing games until they reach classical mastery.

The availability of supporting facilities got the lowest score from student responses, which was 75%. This shows that universities have not provided adequate facilities to support environmental chemistry lectures, nor to accommodate computational thinking (CT) skills. In fact, supporting facilities are one of the factors that affect learning outcomes, including computational thinking skills (Widianto, 2020). Indicators related to the application of computational thinking (CT) and its benefits received a percentage of 76.5%. One of the statement items in the indicator is related to the benefits and importance of CT for students. In this item, most students feel the need to be trained in computational thinking (CT) skills because they consider CT skills important for them to have in an effort to solve problems in lectures and the real world. In this sense,

studying computational thinking (CT) is more likely to lead to the development of heuristic problems, approaches, and 'thinking habits' rather than applications to learning how to use computational artifacts (Grover & Pea, 2018).

According to Wing (2011) thinking computing will become a basic skill used by everyone in the world in the mid-21st century. Computational thinking can also be interpreted as a way to find solutions to problems from input data by using an algorithm. Computational thinking is intended to solve problems, not only for problems surrounding computer science, but also for solving various problems. Machine learning, for example, has changed how statistics are used. In the field of biology, data mining (which is a computational concept) can search large amounts of data to find patterns. The hope is that data structures and algorithms (which are abstraction techniques in computer science) can describe protein structures in a way that describes their functions (CSTA, 2011). Computational thinking is also important to have in an effort to understand chemical concepts because most of the material in chemistry is abstract. One example of an abstract chemistry material is the shape of a molecule. Environmental chemistry as part of chemistry also has abstract learning materials, for example air pollution levels. Therefore, it is very important to equip students with computational thinking skills to solve various problems in environmental chemistry courses.

CONCLUSION

Based on the findings of the field study, analysis and theory development, conclusions can be drawn including the results of the curriculum analysis show that the Science Education Study Program has included computational thinking skills as one of the skills in CPL, environmental chemistry lectures are still dominated by explanations. theory by lecturers and discussion, also lecturers do not fully understand the concept of computational thinking so that it has not been applied in environmental chemistry lectures. In general, students think that environmental chemistry lectures have been going well, and computational thinking skills is very important to provide students with prospective science teachers. The limitation of this research is that the students' basic computational thinking skills have not been explored. Therefore, there is a need for further research related to the basic understanding and computational thinking ability of students.

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