

CINTA as an Effective Learning Model to Improve Students' Critical and Creative Thinking Skills

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Submission date: 26-Dec-2021 09:05PM (UTC+0700)

Submission ID: 1735719224

File name: Artikel_Journal_of_University_Teaching.docx (77.13K)

Word count: 6989

Character count: 40941



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Journal of University Teaching & Learning Practice

Volume XX | Issue XX

Article XX

20XX

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Keywords

love, critical thinking, communicative, learning model



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Keywords

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Introduction

One of the things that can be done to prepare future generations well ⁸ through education. Education is the spearhead in shaping students into individuals who are able to think critically and solve ³⁰ problems wisely. Students are not only equipped with knowledge, but also critical thinking. The ability to analyze and adapt creatively to new situations is at the core of critical thinking. In addition, the learning process in the classroom should also explore critical thinking skills by giving students the opportunity to analyze and ³⁶ then discuss the subject matter received and then be able to communicate it in writing or verbally (van Peppen, Verkoeijen, Heijltjes, Janssen, & van Gog, 2021). Therefore, Critical thinking is important for ³³ students because they later will become the future of the next generation (Paul & Elder, 2008). In essence, critical thinking requires students to use their ability to reason (Puspita & Aloysius, 2019). In learning during a pandemic that takes place online, students' critical thinking is needed to be able to carry out learning well. This is due to the distance that separates the teacher and students so that independent learning can achieve learning objectives.

Students should be able to become critical thinkers, namely questioning the ideas and assumptions ² even rather than taking them for granted and sometimes not understanding them well. Students are expected to be able ³ to identify, analyze, and solve problems systematically. Critical thinking skills will of course lead students to be able to communicate well (Supriyatno, Susilawati, & Ahdi, 2020). This is due to their curiosity to find answers to all the problems they face. Learning models that are motivating students so that they always improve their competence really need to be developed (Palmer, 2005). The ability to communicate of course be a bridge for students and teachers in channelling their ideas and participation in learning that takes place both offline and online (Hasanah & Nasir Malik, 2020).

¹⁵ Students in the 21st century need their own version of learning, where they can analyze and evaluate new information while at the same time they can organize and plan what they should do with the new information. Even so, critical thinking skills are not limited to the academic field, but critical thinking is an essential life skill (Jonny, Rajagukguk, & Rajagukguk, 2020). So that critical thinking will not only be useful for student learning at school but also for the sustainability of their future lives, both personally and in the social environment. Critical thinking is quite important in the world of education (Fitriani, Zubaidah, Susilo, & Al Muhdhar, 2020). Critical thinking helps students to be able to evaluate themselves critically, including strengths and weaknesses. In addition, critical thinking will certainly indirectly teach various strategies and skills that are appropriate and in accordance with life's problems ((Ritonga, Safrida, Huda, Supriatno, & Sarong, 2020; Wale & Bishaw, 2020).

Critical thinking is a skill that must be mastered by students at every level. By thinking critically, students will be easy to adapt to changes in society (Kurjum, Muhid, & Thohir, 2020). Considering that currently they are starting to prepare themselves to enter the era of soc ²⁹ 5.0 where students are expected to be able to use technology properly and wisely. Students must be able to think creatively and critically so that later they can become a successful generation (Marnita, Taufiq, Iskandar, & ³⁵ Ahmi, 2020). Critical thinking is considered as a must-have ability to welcome a global society. Critical thinking is one of the skills that students need to develop and succeed in the global economic era, in addition to creativity, innovation, problem solving, communication, and collaboration (Khairani, Suyanti, & Saragi, 2020).

Based on the observations made during online learning, most students became passive participants. This is because they are unable to understand the material being taught, and do not know how to obtain information about the learning being carried out. Communication between educators and students is also not going well. Most teachers only provide learning materials, asking students to do assignments without providing a broader explanation of the material being taught. Students feel bored and have difficulty in learning. It is not uncommon for parents to experience difficulties when accompanying their children to study. This is because many teachers only give assignments without providing material and explanations about the topics they teach. Indeed, a creative educator will always create ideas in designing new learning systems that are able to make students able to achieve their learning goals with full satisfaction. Therefore, to solve the problems mentioned above, the development of learning models is a solution that is expected to be able to overcome the learning gap between students and teachers both through offline and online learning.

Several studies have been conducted concerning learning models and how their effectiveness to improve students' learning achievement (e.g.: Faradillah & Humaira, 2021; Hafeez, 2021; Sutiani, Situmorang, & Silalahi, 2021). However, most of the investigated learning models were the learning models which had been previously designed by education experts or other researchers. However, in this study, the learning models were designed by the researchers of this study and implemented in experiment class to see their degree of effectiveness. Therefore, this is considered as a new learning model in the world of education called the CINTA learning model.

CINTA is an acronym of Communicating, Inquiring, Networking, Teaching, Applying. It is a learning model that is developed to improve students' critical thinking so that they are able to communicate well. The learning model is designed to facilitate teachers to communicate competencies and learning topics (communicating) that are implemented. Then students are given the opportunity to ask questions about the topic presented by the teacher (inquiring), then the teacher gives a brief explanation of the topic and then gives a number of questions/problems. Furthermore, students look for answers to these problems/questions by doing networking on google online (networking). At this stage, students are given the freedom to get the widest possible information out the topics discussed so that they can increase their knowledge of science. At the next stage, students are given the opportunity to convey the answers they learned from Google, then the teacher gives a complete explanation of the topics discussed (teaching). In this case, the teacher plays a role in providing points from the material discussed (Slavin, 2009). The knowledge that students get through online media of course provides a broad view of the topics presented so that teachers are expected to be able to summarize and conclude the material so that students can easily understand it. At the last stage, students are given exercises to apply what they have learned (applying).

Furthermore, the present study showed that the CINTA learning model (Communicating, Inquiring, Networking, Teaching, Applying) is not merely developing students' critical thinking, however, it also improves students' learning motivation in learning and their willingness to gain more skill in learning. Moreover, students become eager to apply their knowledge to more productive performance and products.

Literature Review

Learning Model Development

To develop learning models and designs, it is necessary to have an adequate understanding of concepts related to learning, the meaning of which can vary depending on the underlying learning theory. The design of learning models is a systematic process for designing learning models. The preparation is done by describing the stages that will be passed in the learning process (Widiastuti, Padmadewi, & Artini, 2013). In general, the stages in question are presented in the form of flowcharts or activity schemes (Setyosari, Punaji, & Sulton, 2003). The flow chart or activity scheme in this learning design system is called the learning model. Thus, what is meant by a learning model is a flow chart or activity scheme that describes the learning process from goal setting to evaluation to determine its achievement (Priyanto, 2009). Therefore, the preparation of this learning model is generally intended as a guide in carrying out learning and is an inseparable part of activities in the preparation of learning designs (Gurgur & Uzuner, 2011).

One of the steps in developing the learning model is the ADDIE model which stands for Analysis, Design, Development or Production, Implementation or Delivery and Evaluations. This model can be used for various forms of product development such as models, learning strategies, learning methods, media and teaching materials. The ADDIE model was developed by Dick and Carry (1996) to design a learning system.

Critical Thinking and Creative Thinking

Critical thinking is a systematic thinking activity that allows a person to formulate and evaluate their beliefs and opinions alone. So, someone in critical thinking uses thinking that makes sense to decide what to do accordingly with their intellectual abilities (Sari, Sumarmi, Astina, Utomo, & Ridhwan, 2021). Critical thinking is reasonable, reflective thinking that is focused on deciding what to believe or do. According to this definition, critical thinking emphasizes thinking sensible, reflective. This reasonable and reflective thinking used to make decisions. Creative thinking is an expression (expression) of uniqueness individual in interaction with his environment. creative expression this reflects the originality of the individual (Adnan, Zulfikar, Armia, Gade, & Walidin, 2021).

Creative thinking is an individual's ability to think what everyone had been thinking, so that individual able to do what has never been done by all person. Sometimes creative thinking lies in helpful innovation yourself to do old things in new ways. But the point is, to see the world through enough eyes new so that new solutions emerge, that is what always provide added value. Based on the description above, it can be concluded that the notion of creative thinking is a person's ability to create new ideas or ideas so as to make them feel able to achieve shared goals in life (Wijaya, Zhou, Ware, & Hermita, 2021).

Empirical review

The research on the development of learning models is a form of research that is motivated by previous studies that have been carried out by researcher²³ related to the development of learning methods, learning techniques, and learning assessments. A Study on the Implementation of English School-⁶¹ Curriculum in SMA Negeri 5 Denpasar is a study conducted by researchers to determine the implementation of the curriculum in schools. This study found that the development of learning models in anticipating student needs is necessary for designing curriculum and learning syllabus (Widiastuti, 2018). Another research conducted by the researcher entitled states that improvements in learning techniques, strategies or learning models need to be carried out to improve students' learning abilities so that learning objectives can be achieved. From the results of this study, it is known that a teacher should be able to modify learning strategies in the classroom, either by changing techniques, media, or learning models that are deemed unable to meet the needs of students.

Subsequent research entitled Formative Assessment in EFL Classroom Practices found that making communicative tests or teaching materials is an important thing in adjusting the characteristics of students with the material being taught (Widiastuti & Sa²⁴h, 2017). The student's level of ability is a major consideration in developing a test. This is in line with the model development research that is carried out, namely designing a learning model by considering the needs and characteristics of students. On the other hand, the communicative concepts found in this study provide an overview in developing this learning model.

The research entitled Developing Learning Methods of Indonesian as a Foreign Language found that there are several learning methods that teachers tend to use in improving students' communication skills. Teachers use communicative methods in learning. Therefore, the model can be used as a reference in developing learning models to improve students' communication skills (Supars⁴²lantra, & Widiastuti, 2017). Other research related to this research is a previous study entitled Students' Perception of Assessment and Feedback Practices: Making Learning Visible which states that students' perception⁵³ of assessment and feedback provide an overview of the importance of learning models that provide opportunities for students to develop critical thinking patterns and independent (Widiastuti, Mukmination, Prayogo, & Irawati, 2019, 2020). Several preliminary studies that have been conducted by researchers provide a clear picture of the importance of developing innovative learning models that can integrate offline and online learning to improve the student's critical thinking skills and communication skills. Therefore, research on the development of the CINTA learning model is expected to provide some learning concepts needed by students.

Research Methods

This study made use of a mixed-method research design¹². There were two main data in this study, they were qualitative data and quantitative data⁸. The qualitative data were collected by conducting semi-structured interview⁵² with the selected lecturers of the English Language Education Study Program. The lectures selected as the sample of the study were randomly selected and they were asked a series of questions to establish valid and reliable data. They were interviewed in a relaxed atmosphere to ensure they were comfortable in giving the required information. Moreover, the qualitative data were also gathered through conducting classroom observation, where the researchers join the online classro³¹ as passive participants. The qualitative data were collected through conducted experiment to the fourth-semester students of the English language education

study program at Mahasaraswati University, Denpasar, Bali. The sampling technique used in determining the experimental groups was a cluster random sampling and obtain class C as the experimental group who took part in learning with the CINTA Learning model and class F as the control group that followed learning with the conventional learning model.

The design of this study was a pretest-posttest control group design. Here is the research design:

Tabel 1:
Research design

Class/group	Pre-test	Treatment	Post-test
Control	L1	X	L2
Experiment	L1	Y	L2

L1: Critical Thinking before treatment

X: Conventional Learning

Y: CINTA Learning Model

L2: Critical Thinking after treatment

This study used research instruments in the form of learning devices, observation sheets, test instruments, and questionnaires. The learning tools used are lesson plans (syllabus, lesson plans) and student activity sheet. There were two types of lesson plans made, namely lesson plans for the experimental group with the CINTA Learning Model and lesson plans for the control group with the conventional learning model. The observation sheet is used to determine the implementation of the learning carried out. Indicators of learning implementation are made based on the steps of the learning model used, namely the CINTA learning model and the conventional learning model. Critical thinking skills instruments in the form of written tests and questionnaires. The written test is in the form of multiple-choice questions with indicators that refer to the Critical thinking concepts. The written test is used to measure the knowledge aspect of critical thinking skills. Data on the critical thinking skills of experimental group students and control group students were critically analyzed using an independent sample t-test and descriptively presented to establish valid and reliable findings.

Results and Discussion

The section provides an explanation of the problems faced by students when studying offline and online and the effectiveness of the CINTA learning model in improving students' critical thinking and communicative skills in offline and online integration learning.

The following table shows the average pre-test score of the critical thinking in the experiment and control class.

Table 2:
Pre-test Results of Experiment and Control Class

No	Aspects of Critical thinking	Pre-test	
		Experiment group	Control Group
1	Identifying ability	60	60
2	Evaluating ability	62	62
3	Concluding ability	63	61
4	Giving opinion ability	61	62

Mean	61.50	61.25
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In the table above, the average result of the literacy ability pre-test which consists of aspects of identifying ability, evaluating ability, concluding ability, giving opinion ability in the experimental group is 61.50, while in the control group it is 61.25.

Table 3 below shows the average post-test score of critical thinking in the experimental class and the control class.

Table 3.

The First Post-test Results of Experiment and Control Class

No	Aspects of Critical thinking	Pre-test	
		Experiment group	Control Group
1	Identifying ability	74	61
2	Evaluating ability	75	63
3	Concluding ability	78	62
4	Giving opinion ability	76	63
	Mean	75.75	62.25

In the table above, the average result of the first post-test compared with the pre-test which consists of aspects of identifying ability, evaluating ability, concluding ability, giving opinion ability in the experimental group is 75.75 while in the control group it is 62.25.

Table 4:

The Second Post-test Results of Experiment and Control Class

No	Aspects of Critical thinking	Pre-test	
		Experiment group	Control Group
1	Identifying ability	83	62
2	Evaluating ability	82	64
3	Concluding ability	80	65
4	Giving opinion ability	78	64
	Mean	80.75	63.75

In the table above, the average result of the second post-test compared with the pre-test which consists of aspects of identifying ability, evaluating ability, concluding ability, giving opinion ability in the experimental group is 80.75 while in the control group it is 63.75.

Table 5:

The Students' Motivation Changes towards the learning Implementation between the Experiment and Control Class

No	Aspects of Critical thinking	Pre-test	
		Experiment group	Control Group
1	Strongly Agree	75%	10%
2	Agree	20%	15%
3	Undecided	5%	40%
4	Disagree	0%	35%
	Mean	100%	100%

The students' changes in their learning motivation as indicated by the table above showed that their learning motivation is much higher when CINTA learning models were implemented in the experiment group. This can be clearly seen from the table that 75% of students strongly agree, 20% of students agree, 5% of students are undecided and there were no students who disagree. Meanwhile, in the control class, the students' learning motivation was not very strong compared with the experiment class. This can be clearly seen from the table that 10% of students strongly agree, 15% of students agree, 40 students are undecided, and 35% of students disagree.

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The excerpts of the interviews conducted after the implementation of the CINTA learning model can be summarized as the following:

"When I applied the CINTA learning model, all my students were really active in engaging themselves in learning activities. They answered all my questions critically and most of their answers are correct" (Lecturer A)

"CINTA learning model allows me to enrich my students' critically thinking. They actively participated in the class and they were active in all processes of critical thinking such as identifying the problems, evaluating the possible answers, giving opinions, and concluding the lesson improved dramatically". (Lecturer B)

"Implementing CINTA learning model was such good experience for me. My students were really active in giving opinions, where they were usually shy and they preferred to be quiet rather than give their opinion. But when CINTA learning model was introduced through its five main phases of learning, my students were active in giving their opinion, this is because their critical thinking has improved" (Lecturer C)

"Well, the five phases of the CINTA learning model were really engaging my students to learn and develop their critical thinking skills. Most of my students were active in identifying, evaluating, giving opinions, and also concluding. Their active participant in learning improved significantly since the learning process was initiated by communicating phases, where all students were practiced to communicate their prior knowledge" (Lecturer D)

"For me, CINTA learning model is a very good learning model to be conducted in the millennial era because this model is very effective to improve students' critical thinking. All my students love the five learning phases which made them really engage in the learning process and

actively in finding solutions to all problems given to them to be solved”
(Lecturer E)

The expects of the interviews indicated that all lecturers considered that CINTA (Communicating, Inquiring, Networking, Teaching, Applying) learning models is an appropriate learning model to be conducted in the classroom to improve students' critical thinking. Most lectures positively commend that the CINTA learning models improved their students' critical thinking and their students have actively participated in all phases of learning. Moreover, students were found to engage themselves in all learning activities.

Discussion

Based on the experiment conducted on the experiment group and the control group, clearly showed that the CINTA learning model is more effective than the conventional learning model when viewed from the critical thinking skills. This clearly can be seen from the mean score of critical thinking of students in the first posttest in the experimental group is 75.75 while in the control group it is 62.25. Meanwhile, the mean score of critical thinking of the students in the second post-test in the experimental group is 80.75 while in the control group it is 63.75. This showed that the critical of the students significantly improved after the implementation CINTA learning model in the experiment class, meanwhile the critical thinking skill of the students in the control class only had hardly any improvement.

The critical thinking skills of students who follow the CINTA learning model are better than the students who follow the conventional learning model. This is because, in CINTA learning, students are accustomed to active discussions, work together in groups, and present the results of discussion activities in front of the class so that students' critical thinking skills develop well. When students are given worksheets containing problems, students try to solve these problems with group discussions. Students actively discuss with group members to come up with ideas to solve the problem. Students who take part in CINTA learning are accustomed to expressing their opinions using their own sentences so that aspects of concern for students will develop. In addition, students carry out investigative activities such as seeking information from references (books, friends, teachers), planning problem solving, solving problems, and re-examining the results of their work. Investigation activities, seeking information, and solving problems will make students' abilities in the knowledge aspect develop. The solutions given by students in solving problems can hone students' abilities in the aspect of attitude. All of these processes can result in students playing an active role in learning so that students' critical thinking skills develop well.

The students' changes in their learning motivation as indicated by the table above showed that their learning motivation is much higher when CINTA learning models were implemented in the experiment group. This can be clearly seen from the table that 75% of students strongly agree, 20% of students agree, 5% of students are undecided and there were no students who disagree. Meanwhile, in the control class, the students' learning motivation was not very strong compared with the experiment class. This can be clearly seen from the table that 10% of students strongly agree, 15% of students agree, 40% of students undecided, and 35% of students disagree.

Data analysis of learning motivation changes clearly showed that students actively participated in the learning process when the CINTA learning models were implemented by the lecturers. Students were actively learning and doing all the activities conducted in all stages of learning (communicating, inquiring, Networked learning, teaching, and applying. Moreover, during the applying stage, students were actively practiced their knowledge into realistic products and performance. This indicated that the CINTA learning model is not only aroused students' motivation and learning but also helps students broaden their critical and creative thinking skills.

The data collected from the interviews also confirmed that CINTA (Communicating, Inquiring, Networking, Teaching, Applying) learning model is one of the learning models which really engages students in learning and improves their critical thinking. Lecturers found that all their students were active in identifying, evaluating, giving opinions, and concluding the solutions to the problems provided by the teachers during the learning process. Moreover, students were also found to be active in participating in the five phases of learning which make the students really involved in learning from the beginning of the lesson. The lesson is started by communicating their prior knowledge in which students have the opportunity to communicate to share their prior knowledge with their classmates.

This learning model also develops students' 21st-century skills because it includes communicating, inquiring, a network working, teaching, and applying. All those skills are really important nowadays to be able to cope with the development of modernization and globalization which require students to have good critical thinking. By having the ability to communicate well, students should be able to encounter the problems they have to deal with in life. Moreover, by practicing their ability to make inquiries and doing networking, students may have better knowledge and broader understanding towards what the problems and find an appropriate solution. Additionally, the CINTA learning model allows students to apply their knowledge to develop their ability to create something useful for human life.

Based on the results of observations made, the lecturers in this study carried out several activities of implementing CINTA learning. During the core activity, the lecturer prepares psychological and physical student learning conditions to participate in learning activities and explains the learning objectives and learning competencies that must be achieved as well as the scope of learning. At this stage, students understand the learning objectives and the scope of learning delivered by the lecturer. By asking the condition of the students before learning, the students stated that they were ready to learn. The next activity carried out is the core activity. In the early stages of the core, activities carried out Communicating activities. At this stage, the lecturer asks students about the topic being studied. Some students seem to answer the lecturer's questions. Furthermore, the lecturer communicates the subject matter well and in detail, provides opportunities to ask questions about the teaching material being studied, gives students/other students to answer their friends' questions, and provides additional explanations for emphasis and additions to the answers given by students. At this stage, students ask questions about the topics discussed.

The activity at the next core stage is the inquiring stage. At this stage the lecturer performs several activities including: giving assignments in the form of problems that students must find solutions for, giving students the opportunity to ask their friends about the problems given, and giving students the opportunity to ask other people, for example, other lecturers, experts and others about the problems given. Students listen to the lecturer's explanation carefully then they do the tasks given by the lecturer. Students discuss some assignments with their peers. At this stage, students

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are expected to be able to improve their critical and creative thinking skills. ²⁶ thinking critically, they can analyze the things needed to produce critical and creative thinking. As stated by Mardianto, creativity ⁹ is the product of a good and right way of thinking (Nehe, Surya, & Syahputra, 2017). Creativity is the general ability to create something new, because of the ability to provide new ideas that can be applied to problem-solving, or as the ability to know the relationship between existing elements (Munandar, 2009).

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In addition to critical thinking, creative thinking is needed in learning, because students are expected to be able to create something from the knowledge they have. Creativity is the ability to combine, solve or ⁴⁰ overcome problems, and reflects the operational ability of creative children (Munandar, 2009). Creative thinking is to provide various possible answers or problem solving based on the information provided and spark many ideas on a problem (Yamin, n.d.).

3

Networked learning is the third stage of the core activities ³ carried out by lecturers and students. At this stage, the lecturer gives assignments for students/students to discuss in small groups, provides opportunities for students/students to find solutions from available online sources, provides opportunities for students/students to present the results of their discussions in front of the class, as well as providing opportunities to ask questions about student presentations. Students form small groups through a breakroom made by the teacher. They discuss the assignments given by the teacher through the available breakroom. This type of cooperative learning is very good for improving ¹³ students' ability to exchange ideas and thoughts and find solutions to the learning they are facing. Cooperative learning refers to a variety of teaching methods where students work in small groups to help each other in learning the subject matter.

Students seemed very enthusiastic in conducting discussions and doing the assignments given. Furthermore, the activity is carried out by presenting the tasks that have been discussed. Students present the work they have done. They then had a discussion and Q&A. Students who present their assignments answered the questions of their friends then add input and answers given by the lecturer.

The Teaching stage is the next stage carried out by the lecturer in the core activity. At this stage the lecturer performs several activities; provide opportunities for students/students to teach what they understand to their peers in the form of small groups, provide opportunities for students/students to teach what they understand to their peers in the form of presentations in front of the class, and provide ³ additional emphasis and explanations to complete the explanations of students/students. In this activity, students are then given the opportunity to teach the material discussed. They also give emphasis to the material discussed.

At the Applying stage, the lecturer carries out several stages of activities including; provide exercises for students to apply what has been understood in the form of products/works (monologue/dialogue, products, for example, sentences, paragraphs, speeches, conversations, conferences, paragraphs, texts, pictures, designs, concepts, objects, etc., providing opportunities for students/students to present or demonstrating their work, providing opportunities for students/students to ask questions about the presentation of the theme, and providing additional emphasis and explanations to complete student/student explanations. On this occasion, students then make a work, in the form of writing or text about the material being studied.

The last activity of CINTA learning is the closing activity. At this stage, the lecturer concludes the material being studied, provides an assessment of student understanding in the form of product-

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based tests, provides additional tasks related to learning/lecture materials, and closes learning/lecture activities. Students pay close attention to the conclusions conveyed by the teacher, ensure additional assignments are given and say thank you and goodbye for the material taught today.

All stages of the CINTA learning model comprising Communicating, Inquiring, Networking, Teaching, Applying could develop students' active participation in learning because the activities require students to interact intensively in learning both with the teachers and their classmates. Teachers, however, should pay attention to all learning strategies and ensure that all strategies are appropriately conducted.

Conclusion

Learning models that stimulate students' critical thinking processes are very well implemented in the classroom. Students participate actively to participate in the ongoing learning. Students can be more critical and creative in expressing their ideas and be able to develop their potential. This is in line with the revision of Bloom's taxonomy that students are expected not only to have ¹³ knowledge, understand the knowledge, be able to analyze the knowledge they have but ³⁹ students are also expected to be able to produce a product from learning outcomes. Both products are in the form of critical thinking and learning outcomes. To develop critical and creative thinking skills, the CINTA learning model is a learning model developed to suit learning needs.

³ This learning model consists of several stages of activities, namely the preliminary, core and closing ⁶² stages. At the closing stage there are five stages of interrelated activities so that they can create students' critical and creative thinking ². The five stages are Communicating, Inquiring, Networking, Teaching, Applying (CINTA) to improve students' critical ⁵⁴ and communicative thinking skills. the five stages of learning are carried out properly and in accordance with the stages [of learning], then the learning objectives will be achieved. Although learning is done online, the concept of this CINTA learning model can be adapted and implemented well in the classroom. therefore, the CINTA learning model can be implemented in offline and online learning well.

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