Development of the ILC3 Learning Model to Improve Students 21st Century Skills

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Abstract. The purpose of this study is to improve students 21st century skills through the development of the ILC3 learning model (Identify, Literature review, Construct, Create, and Communicate). The development research model used is the 4-D, development model consisting of 4 stages are defining, planning, developing and disseminating. The results of the study showed that the ILC3 model is valid for use in learning with an average of 84,6 with a very valid category. The practical ILC3 learning model is used in teaching seminar courses, these results are in accordance with the data analysis in the small group test which shows a mean of 85.9 in lecturer responses which shows very practical, the average student response is 87.8 which shows very practical, the average ability results students 84.1 in the very practical category. The results of the large group test showed an average of 87.4 in the lecturer's response which indicated it was very practical, the average student response was 88.5 which indicated it was very practical, the average student ability result was 88.5 in the very practical category. The ILC3 learning model is effective in seminar learning seen from student test results. in the small group test, the Ngain value was 0.8 in the high category. Meanwhile, in the large group test, the Ngain value was 0.9 in the high category.

Keywords: development research, ILC3, 21st century skills

1 Introduction

Education has the aim of preparing students to be able to face challenges in the future, so schools or universities must prepare students to have skills in various aspects related to their future work, both in cognitive, affective and psychomotor aspects. Along with global developments, these three aspects have been formulated into something specific which is called 21st Century Skills because these skills will be needed for life in the future [3]. Medan State University is one of the universities that creates graduates in the form of future educators and in responding to the demands of global development, Medan State University must make changes, including improving the quality of the lecture model in each department and study program so that students can acquire 21st century skills, namely; (1) Study skills, (2) literacy skills and (3) Life skills [10], so that students in the future remain competitive.

21st century skills are something that is very important for students to master, therefore it is necessary to integrate 21st century skills in lectures in order to produce output that has the ability to compete in the world of work. Several studies state that one learning model that can develop students' 21st century skills is ILC3 (Identify, Literature review, construct, create and communicate). This research states that the ILC3 learning model is effective in developing students' 21st century skills [1].

ICONSEIR 2024, November 28, Medan, Indonesia

DOI 10.4108/eai.28-11-2024.2355234

Based on this research, changes or adaptations need to be made in the lecture model to facilitate students in acquiring 21st century skills. This form of adaptation is by redesigning the current lecture model which has not fully encouraged students to develop 21st century skills. Early childhood education students will later working as an educator either in the early childhood environment as a teacher, educational practitioner or even as a lecturer at a higher level of education, it is necessary to be prepared by mastering 21st century skills. Through this research, an ILC3-based lecture model was designed that answers this problem. The development of the ILC3 learning model will be applied to seminar courses in early childhood education department. The seminar course is one of the important courses in the ealry childhood education program in Universitas Negeri Medan. This course invites students to analyze various problems in implementing early childhood program that exist around students. So the material in seminar courses with the ILC3 learning model is very relevant, which really directs students to be able to identify and communicate the material they study.

Seminar is a course in the early childhood education program at Universitas Negeri Medan. This course consists of 3 credits which students can study in semester 6. This course provides students with the skills to understand the nature of seminars, design and skillfully carry out seminar activities in the early childhood program. However, before being able to practice this seminar, students must first understand the material regarding the problems of implementing early childhood education. These problems include problems related to early childhood, problems faced by early childhood teachers, problems related to school facilities and infrastructure, problems related to early childhood program management and early childhood education problems related to parents or the community in the school environment. The problems found will be discussed with relevant theories after that, look for alternative solutions to solve the problem, then carry out seminar practice based on the proposals that have been prepared by the students. This course provides students with the skills to prepare a thesis research proposal and practice presenting it. All of these skills are organized into 16 meetings that provide theoretical and practical learning experiences.

The ILC3 learning model is a learning model that confronts students with real-life problems, which ultimately requires students to choose the right solution to solve the problem. The ILC3 model is in accordance with constructivist theory, namely believing that every individual has the ability to form and organize (construct) their own knowledge [7]. The process of forming and compiling knowledge is carried out when individuals think about facing challenges, solving and building a complete concept of knowledge from all the real experiences they have experienced. The constructivist concept is a school of philosophy of science, psychology and teaching and learning theory which emphasizes that our knowledge is the result of our own constructs [5].

The ILC3 learning model is a problem-based learning model, which requires students to find the right solution to the problems they face. According to Indrawati [6], a learning model must have elements, namely syntax, social system, reaction principle, support system, instructional impact and accompanying impact. The elements in the development of the ILC3 model are as follows:

a. Syntax of the ILC3 Learning Model

   The ILC3 learning model has syntax, namely Identifying, Literature review, Construct a prototype, Create, and Communicate:

   1. Identify

      The lecturer explains a little of the material that will be studied and also the problems that exist in the surrounding environment related to this material. At this

stage, questions will usually arise from students and they will discuss them with their friends to resolve these problems.

2. Literature review
   In the literature review stage, students are required to look for sources of information regarding the problems they face. The sources of information in question are books, articles and other relevant literature. At this stage, students will be trained to search for information that can support the formation of solutions in the problem-solving process.
3. Construct
   At this stage students make prototypes of solutions to solve problems by classifying several solutions, selecting solutions, choosing design ideas and materials to be used.
4. Create
   In the stage, students create a solution to the problem by comparing and testing the right solution to solve the problem.
5. Communication
   At this stage students will communicate the results of the discussion in the form of solutions to the problems they face. At this stage students will be assessed on how they communicate the results of their work in front of the class.

a. Social System ILC3 Learning Model
   The social system in the ILC3 learning model is 1) students can express opinions and discuss a problem well and politely, 2) students can work together in the process of solving problems so that they can improve their social interaction skills (collaboration).
b. Reaction principle in the ILC3 learning model
   The principle of reaction in the ILC3 learning model is 1) the lecturer provides responses to answers and solutions as a result of solving problems carried out by students, 2) the lecturer responds to statements put forward by students during the discussion so as to obtain a correct conclusion, and 3) the lecturer improves his/her ability creative, critical thinking, communication and student collaboration by giving assignments so that students are able to solve the problems they face.
c. ILC3 Learning Model Support System
   The support system in the ILC3 learning model consists of media and facilities. Media includes textbooks, LKM, ppt, video. Facilities include a computer/laptop.
d. Instructional Impact of the ILC3 Learning Model
   The instructional impact of the ILC3 learning model is 1) students are able to think creatively and critically in solving problems, 2) students are able to find solutions to the problems they face in the form of assignments by lecturers, 3) students are able to collaborate so they can improve social skills, such as respecting other people's opinions , the ability to work in groups, and appreciate the results of other people's performance, and 4) students are able to communicate actively in the discussion process during the learning process.
e. Impact of Accompanying the ILC3 Learning Model
   The impact of the sender on the ILC3 learning model is 1) students are able to build knowledge optimally from their experiences, seen from increased learning outcomes, 2) students can search for material sources in the problem-solving process, so that students' literacy skills (search for sources of information) increase.

Skills in 21st century learning are also referred to as deeper learning, which has targets for achieving competencies, namely cognitive, interpersonal and intrapersonal skills. Cognitive

skills consist of knowledge, critical thinking, complex problem solving abilities. Interpersonal skills consist of collaboration and communication skills. Meanwhile, intrapersonal skills consist of learning competencies and an academic mindset. Then Mardhiyah et al explained that the 21st century skills that students must have are critical thinking, problem solving, metacognition, communication, collaboration, innovation and creativity and numeracy literacy [8].

Based on the explanations above, in this research the focus of the 21st century skills to be developed is the ability to think critically, communicate, collaborate and be creative.
The research roadmap can be seen in the figure below:

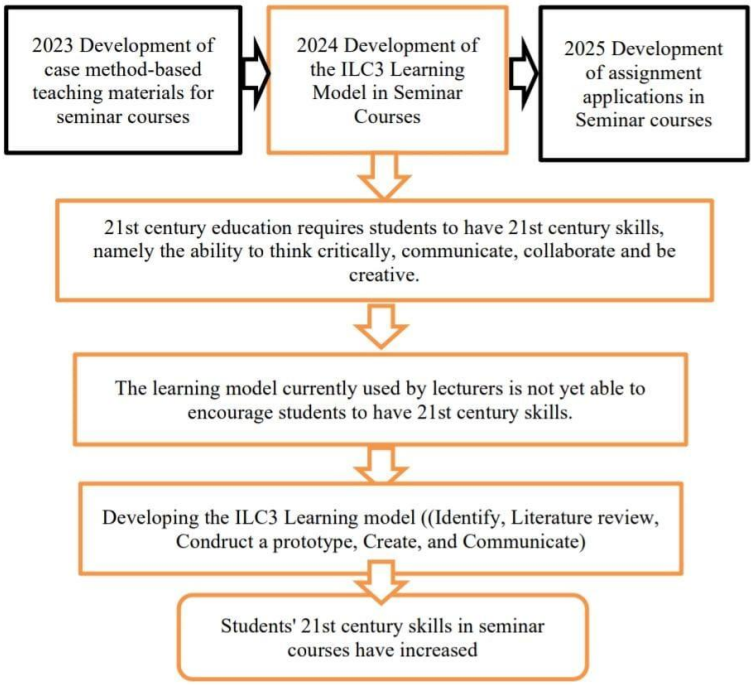

Fig. 1. Research Roadmap

2 Research Method

This research is development research (Research and Development), namely developing the ILC3 learning model to improve the 21st century skills of students in seminar courses. The resulting product is a learning model. The methods used in research and development are qualitative and quantitative methods. Product development research uses the 4-D development model developed by S. Thiagarajan [9]. 4-D development consists of defining, designing, developing and disseminating. The development of this model is implemented in learning tools such as Lesson Planand Student Worksheets in seminar courses.

2.1 Define

The define stage has a goal, namely, to determine and define learning conditions. The define stage consists of analyzing the curriculum used, needs analysis, student character analysis, concept analysis and formulating objectives.

a. Needs Analysis
   Needs analysis is used to determine the problems being faced by seminar lecturers at early childhood education program.
b. Student Character Analysis
   Student character analysis aims to know and see student character so that later an ILC3 learning model can be developed that suits student character.
c. Concept Analysis
   Task analysis activities consist of analysis of Course Learning Outcomes and (Sub-Course Learning Outcomes related to material that will be developed through the ILC3 learning model.
d. d. Formulation of Learning Objectives
   The formulation of learning objectives is a change in behavior that is expected after the learning process using operational verbs.

2.2 Design

The design stage aims to be a planning process for developing the ILC3 learning model in seminar courses.

a. Test Preparation
   At the test preparation stage, it is intended as an evaluation tool after the ILC3 learning model book trial process has been carried out which has been validated by a team of experts. The preparation of the test is carried out based on learning objectives that are in accordance with the ILC3 learning model with seminar course material
b. Media Selection
   The media selection stage aims to improve students' 21st century skills. At this stage the process of developing the ILC3 learning model is adjusted to improve students' creative, critical, communication and collaboration thinking skills. The media used in this research are power point media, image media, videos and student worksheets.
c. Format Selection
   At the format selection stage, namely selecting the format that will be used in the learning process which is adapted to the development of the ILC3 learning model. Choosing a format in development is meant by designing learning or designing lesson content, choosing strategies, approaches, learning methods and learning resources.
d. Preliminary Design
   The initial design in question is the design of all learning tools that must be carried out before testing is carried out. After the initial design is prepared, draft 1 is formed.

2.3 Develop

The initial development steps for the learning model and the tools required consist of (1) creating a guidebook for implementing the ILC3 learning model; (2) determining the ILC3 learning model tools including Lesson Plan and learning outcomes tests as well as instrument validation sheets.

2.4 Disseminate

The dissemination stage consists of three activities, namely validation testing, packaging, diffusion and adaptation. At the validation testing stage, the product that has been revised at the development stage is then implemented on the actual target. At the validating testing stage, it will be disseminated to several lecturers in seminar courses in the early childhood program. During implementation, the achievement of learning objectives is measured. This measure is carried out to determine the effectiveness of the product being developed. After the product is implemented, solutions that have not been achieved need to be resolved so that all learning objectives can be achieved so that the same mistakes are not repeated after the product is disseminated. The final activity is packaging, namely printing the ILC3 learning model manual. After the book is printed, the book will be distributed widely so that it can be absorbed or understood by other people and used (adopted) in their classes.

The population in this study is all early childhood students who take lectures in seminar courses, namely around 107 students, and the sample in this study will be determined based on random sampling techniques for small and large scale use trials.

Identification of variables, parameters and instruments in assessing the development of the ILC3 learning model can be seen in Table 3.1 as follows:

Table 1. Identification of variables and data sources in assessing the development of the ILC3 learning model

Variable	Variables measured	Data source
(1)	**(2)**	**(3)**
Valid	Construct Content	Model validation result sheet, device lesson plan learning outcomes)
Practical	Implementation sheet	Implementation observation results sheet
	Lecturer response sheet	Lecturer response results sheet
	Student response sheet	Student response results sheet
Effective	Critical thinking skills	Student Worksheets
	Creative thinking skills	Student Worksheets
	Collaboration skills	Observation results sheet
	Communication skills	Observation results sheet
	Student cognitive learning outcomes	Pre-test and Pos-test

The types of data used in this research are quantitative data and qualitative data. The data sources in this research were obtained through the following data collection techniques:

A. Questionnaire

The questionnaire is validated to assess the level of validity of an aspect or instrument related to the product being developed, through a validity or practicality assessment sheet filled in by expert validators (lecturers) and user validators (lecturers who teach seminar courses) by providing a check list (√) in the score column for the aspect being assessed and fill in the suggestions or comments column directly on the validity or practicality assessment sheet, with the following scoring categories:

a. Score 4, if the validator gives a very good category rating
b. Score 3, if the validator gives a good category assessment
c. Score 2, if the validator gives a rating in the poor category
d. Score 1, if the validator gives a bad category rating.

Validation result data is obtained by filling in validity and practicality assessment instruments, as follows:

a. Research instrument validity assessment sheet
b. Validity assessment sheet for introductory learning books
c. Lesson Plan validity assessment sheet
d. Test question validity assessment sheet
e. Learning implementation assessment sheet
f. Lecturer response sheet
g. Student response sheet

B. Observation

Observation is a data collection technique by visually observing the behavior and process of a particular activity and then implementing the results of these observations in the form of notes in an observation sheet carried out by the observer. Data from observations in this study were obtained from filling in the observation sheet on learning implementation by marking a check list (√) in the column provided on the observation sheet and writing suggestions or comments directly in the suggestions or comments column contained in the observation sheet by the observer, with the following scoring criteria:

a. Score 1, if the observer assesses "Not Good"
b. Score 2, if the observer assesses "Not Good"
c. Score 3, if the observer assesses "Good"
d. Score 4, if the observer assesses "Very Good"

C. Test

Tests are a data collection technique through giving written questions that have been systematically planned by the lecturer in order to measure students' cognitive abilities or learning outcomes. Data on student cognitive learning outcomes tests in this study were obtained from students filling in pre-test and post-test sheets, in the form of essay questions.

Quantitative data resulting from the validity assessment were analyzed using percentage data analysis techniques, with the help of the following formula:

$$V = \frac{TSE}{TSM} \times 100\%$$

Information:

V = Percentage of assessment level
TSE = Total empirical score
TSM = Maximum total score (Akbar, 2013).

The percentage data that has been obtained is then converted using the assessment categories Table 2.

Table 2. The Assesment Categories

No.	Presentation (%)	Category	Description
1	81,25 < x ≤ 100	Very valid	The product is ready to be used in the field for Learning
2	62,5 < x ≤ 81,15	Valid	The product can be continued with added notes something less provided
3	43,75 < x ≤ 62,5	Lessvalid	The product must undergo revision by researching again carefully and study
4	25 < x ≤ 43,75	Invalid	The contents of the product must undergo revision

Percentage of implementation $= \frac{N}{M}\ x\ 100\%$

information:

N = Total score obtained

NM = Total score (maximum) (adapted from retnowati, 2015).

(Source: Akbar, 2013).

Quantitative data from observations of implementation must be in the practical category with a minimum value of 2 or 3 for each aspect. Quantitative data from observations of learning implementation are then analyzed using the following formula:

The percentage data that has been obtained is then converted using the assessment categories in Table 3

Table 3. The Assessment Categories

No.	Percentation	Category
1	81,25 < x ≤ 100	Very Practical
2	62,5 < x ≤ 81,15	Practical
3	43,75 < x ≤ 62,4	Less Practical
4	25 < x ≤ 43,65	Not Praktical

(adapted from retnowati, 2015)

(Source: Akbar, 2013).

Quantitative data on lecturer responses and student responses to the ILC3 learning model after participating in learning using the ILC3 learning model. The percentage of lecturer responses and student responses can be analyzed using the following formula.

Percentage of implementation = $\frac{N}{M}\ x\ 100\%$

information:

N = Total score obtained

NM = Total score (maximum)

The percentage data obtained was then converted using the assessment categories in Table 4

Table 4. Lecturer Response Criteria and Student Responses to The ILC3 Model

No.	Percentage	Category
1	81,25 < x ≤ 100	Very good
2	62,5 < x ≤ 81,15	Good
3	43,75 < x ≤ 62,4	Enough
4	25 < x ≤ 43,65	Not enough

(Source: Akbar, 2013)

Quantitative data in the form of pre-test and post-test results is at least in the medium category. Quantitative data in the form of student pre-test and post-test scores were analyzed using the Normalized Gain (N-Gain) formula as follows:

$$Gain\ Index\ (G) = \frac{x_{po} - x_{pe}}{NM - x_{pe}}$$

Information:
Xpo = Average post-test score
Xpe = Average pre-test score
NM = Maximum score [4].
Then the data from the gain index calculation is converted using the gain score categories in Table 5.

Table 5. Category gain score Category Score

Score	Category
G ≥ 0,7	High
0,3 < G < 0,7	Medium
G < 0,3	Low

The effectiveness of critical and creative thinking skills is measured using question sheets on the LKM according to the indicators used. Meanwhile, the effectiveness of communication and collaboration skills is measured using observation sheets when students discuss and present the results of the discussion in front of the class. The results of student work and observations are assessed according to the assessment rubric, then analyzed using the following formula.

Percentage = $\frac{N}{NM}\ x\ 100$

Description:
N = Total score obtained
NM = Maximum score
Then the values obtained are converted using the categories of critical thinking, creative, communication and collaboration skills in Table 6

Table 6. Criteria for Levels of Critical Thinking, Creative, Communication and Collaboration Skills

No	Range Score	Criteria
1	81,00 – 100	Very good
2	61,00 – 80,99	Good
3	41,00 – 60,99	Enough
4	21,00 – 40,99	Not enough
5	0 – 20,99	Very low

(Sudijono 2006)

3 Results and Discussion

3.1 Result

3.1.1 Results of the Define Stage

At the define stage, an analysis of the curriculum used is carried out. The curriculum used in the early childhood program is the Outcome Based Education curriculum which prioritizes the outcomes of learning activities, not just the material presented. At this stage, a stage of analyzing the needs of learning activities is also carried out by giving questionnaires to lecturers who teach seminar courses. Based on the results of the analysis carried out, student learning outcomes that are classified as low are in the cognitive abilities and students' ability to think critically. This is due to students' lack of interest in searching for and reading material in seminar courses. Students only read the material contained in the papers presented every week by the group. So the solution that can be taken is to use a learning model that provides students with the opportunity to be able to analyze learning material and communicate it. One learning model that can be used is ILC3 (Identify, Literature review, Construct, Create, and Communicate).

3.1.2 Results of the Design Stage

After conducting a needs analysis, a guidebook for the ILC3 learning model was designed for the seminar course, especially on the issue of early childhood education management in Indonesia. At this stage, a test is then created to test the use of the ILC3 guidebook. This test is intended to test students' understanding before and after the lecturer applies the ILC3 learning model in early childhood education seminar classes. The learning material developed when implementing the ILC3 model is material about early childhood education management problems in Indonesia. This material is presented in the form of real cases that occur around students or are found in online media. The media used in this research are power point media, image media, videos and student worksheets.

So at this design stage all the necessary drafts were formed, such as the ILC3 learning model guidebook for seminar courses and learning tools for seminar courses on early childhood education management issues in Indonesia.

3.1.3 Results of The Develop Stage

After the initial draft is formed, the ILC3 learning model book is validated and the learning tools that have been created are validated. The next step is to validate the draft learning tools that have been created. The ILC3 learning model will be applied to seminar courses, especially on early childhood education management issues in Indonesia.

Based on the results of the analysis the average score obtained for the three components above is 84.6 in the very valid category. So based on these results, the ILC3 learning model guidebook, and the materials used are valid for use in teaching seminar courses on early childhood management issues in Indonesia. Apart from that, what is prepared in the learning tool is the Student Worksheet.

The next step was to conduct a small group trial which was carried out on 10 students who attended seminar course and 2 lecturers who taught seminar courses. Learning activities were carried out over 2 meetings. The results of this small group test include lecturer responses, student responses and results of critical thinking, creative thinking, collaboration and communication skills.

Based on the results of the analysis of lecturer and student responses in small group tests after implementing the ILC3 learning model in seminar courses, it can be concluded that the ILC3 learning model is practical to use.

Next, to see whether the ILC3 model is used effectively or not, the results of students' 21st century abilities will be analyzed which include the ability to think critically, think creatively, collaborate and communicate and also look at the results of students' pretest and posttest when taking seminar courses using the ILC3 learning model. To see whether the ILC3 model is practical or not, the Ngain index is also calculated from the students' pre-test and post-test results. The results obtained were the average pre-test result was 62.1 and the average post-test result was 92.5 so the Ngain index was 0.8 in the high category. Based on the results of the analysis of 21st century abilities and the results of the analysis of students' cognitive abilities, in this small group test it can be concluded that the ILC3 learning model in seminar courses is practical to use. Based on the results of the small group tests that have been carried out, what needs to be revised is the development of students' communication skills so that they can be further improved. The next step is to conduct a large group test on students taking seminar courses in class A, class of 2021, totaling 35 people. The lecturer response results in the large group test were 87.4 in the very practical category. Meanwhile, student responses showed a mean of 88.5 in the very practical category. In the results of the analysis of students' 21st century abilities, the average was 86.5 in the very good category and the Ngain index was 0.9 in the high category, which shows that this learning model is practical. Based on the analysis of the entire data carried out, there is no need for further revisions, the resulting product can be continued to the next stage, namely Disseminate.

3.1.4 Results of the Disseminate stage

At this stage, the resulting product is then reproduced and disseminated to other seminar course lecturers so that it can be implemented in each class. However, due to limited research time, this stage can be carried out in the next even semester so that the material used is relevant to the guidebook that has been designed.

3.2 Discussion

Based on the results of data analysis that has been carried out previously, it can be concluded that the ILC3 learning model applied in seminar courses can improve students' 21st century abilities which include the ability to think critically, think creatively, collaborate and communicate. The ILC3 learning model can develop students' 21st century abilities because during the learning process students are facilitated so they can build their own knowledge [9]. The ILC3 learning model helps students understand cases related to early childhood management problems in Indonesia. The initial stage in this learning model is for students to identify cases found in the immediate environment, whether found directly or cases found in online news or social media.

Students will look for solutions to problems they find through various references, in this case students will be trained to develop their critical thinking skills and creative thinking skills. Critical thinking skills can help students improve their learning abilities, solve problems more effectively, and make wiser decisions [2]. There are several learning strategies and techniques that can be used to improve critical thinking skills, such as problem-based learning and collaborative learning found in the ILC3 learning model.

While looking for a solution to the chosen early childhood management problem, students will work together to find the right solution so that this will develop students' ability to collaborate. The solutions found based on theoretical analysis will be arranged in the form of a problem solving recommendation table which will be presented in groups. So the communicate syntax in ILC3 will support the development of students' 21st century skills, especially communication skills.

4 Conclusion

Based on the results of data analysis that has been carried out on the ILC3 (Identify, Literature review, Construct, Create and Communicate) learning model in the seminar course, it can be concluded that:

a. The syntax of the ILC3 learning model, namely Identify, Literature review, Construct, Create, and Communicate, is valid for use in seminar learning with an average of 84.6% in the very valid category.
b. The practical ILC3 learning model is used in teaching seminar courses, these results are in accordance with the data analysis in the small group test which shows a mean of 85.9 in lecturer responses which shows very practical, the average student response is 87.8 which shows very practical, the average ability results students 84.1 in the very practical category. The results of the large group test showed an average of 87.4 in the lecturer's response which indicated it was very practical, the average student response was 88.5 which indicated it was very practical, the average student ability result was 88.5 in the very practical category.
c. The ILC3 learning model is effective in seminar learning seen from student test results. in the small group test, the Ngain value was 0.8 in the high category. Meanwhile, in the large group test, the Ngain value was 0.9 in the high category.

Based on the results of the data analysis that has been carried out, there are suggestions for lecturers who will apply the ILC3 learning model in seminar courses so that they can build student motivation to be able to find the latest cases regarding management in Indonesia.

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