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The Imperative of LOGIC in nurturing students' Higher Order Thinking Skills

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Abstract

Along with the implementation of the Indonesian Ministry of Education, Culture, Research and Technology program commonly known as *Merdeka Belajar*, the government is encouraging differentiated learning to facilitate students' freedom in learning. Meanwhile, what teachers do to facilitate *Merdeka Belajar* is assignments or project work. To achieve the goal of this assignment and project, students are engaged in active learning. However, the ultimate goal of learning is not the product but the mental process that occurs behind it. This study aims to develop a learning model to foster students' higher order thinking skills with a structured scaffolding in the form of the acronym LOGIC. Starting with *Listen* or listening to clear instruction, overview, prompting questions. Then followed by *Observe* or observing the visible inputs in video, picture, graph, or chart. *Gather* means collecting information through active discussion with peers. *Identify* which means identifying all the necessary information and finally *Create* or producing something. These steps are arranged in such a way as to provide guidance to students so that they are accustomed to developing critical thinking skills before finally producing a project. Research data is analyzed and validated to obtain valid and reliable results. Though this research implement the learning model in higher education, pragmatically this design can be used for the learning process at various levels of education units from elementary school to tertiary education. This learning model is also not limited to language teaching, in all subjects, both STEM and Non-STEM, it can also be applied.

Keywords: *critical thinking; higher education; HOTS; instruction; learning model;*

INTRODUCTION

In the ever-evolving world of education, higher order thinking skills (HOTS) are the foundation for preparing students to thrive in the complexities of the modern world. Higher order thinking skills encompass a spectrum of cognitive abilities, including critical thinking, problem solving, analysis, synthesis, and creativity. These skills empower individuals to navigate uncertainty, engage with complexity, and innovate solutions to challenges. Therefore, HOTS development is essential in developing students' capacity to become adaptive, resilient, and effective contributors to society. HOTS development is in line with 21st century learning skills that include critical thinking, creativity, collaboration, communication, media and technology literacy, flexibility, productivity, social skills, and leadership (Mantra, 2019).

While the importance of fostering higher-order thinking skills is widely recognized, the methods educators can use to effectively facilitate the development of higher-order thinking skills remains a subject of research. Traditionally, educational approaches have often centered on task completion or memorization, which may not inherently foster the deeper cognitive processes associated with HOTS. Assigning students to create something, such as a project, presentation, or essay, does not automatically guarantee the development of higher-order thinking skills. Instead, clear instructional guidance and scaffolding provided throughout the learning process play a critical role in facilitating the development of these important cognitive abilities.

Recognizing the gap between assignment and higher-order thinking skills development, this research proposal seeks to address this challenge through the development of a new learning model: the LOGIC (Listen, Observe, Gather, Identify, Create) model. By integrating key principles of effective teaching, scaffolding techniques, and tailored strategies to promote

HOTS, the LOGIC model aims to provide a structured framework for educators to systematically strengthen students' higher-order thinking skills (Kebritchi *et al.*, 2017).

Through the application of the LOGIC model, students will be guided through a comprehensive learning process that emphasizes active engagement, critical reflection, and the application of knowledge in diverse contexts. By developing a learning environment that encourages students to listen attentively, observe carefully, gather relevant information, identify underlying patterns and connections, and ultimately create innovative solutions, the LOGIC model seeks to empower students with the essential cognitive tools needed to excel in an increasingly complex and dynamic world.

In essence, this research proposal seeks to contribute to the ongoing discourse around improving higher-order thinking skills in education by offering a practical and innovative approach in the form of the LOGIC learning model. Through empirical investigation and iterative refinement, it is hoped that the LOGIC model will emerge as a valuable resource for educators seeking to cultivate the next generation of critical thinkers, problem solvers, and innovators (Desyandri *et al.*, 2019).

METHOD

This research is development research in the form of a LOGIC learning model (*Listen, Observe, Gather, Identify, Create*) by utilizing ADDIE research model. There are five steps in the development procedure, namely (1) analyzing (*Analyze*), (2) designing (*Design*), (3) developing (*Develop*), (4) implementing (*Implement*), and (5) evaluating (*Evaluate*) (Buil-Fabregá *el al.*, 2019).

The first step is analysis focused on needs analysis. At this stage, researchers analyze problems that are often encountered in assignments and learning in the classroom. The next step is to design a learning model to accommodate all problems encountered by students in the learning process and completing assignments. After that, LOGIC (*Listen, Observe, Gather, Identify, Create*) is formulated by identifying the learning phases that can support the learning process. After the steps of the LOGIC learning model are designed, it is continued with the implementation of a trial of the learning model in the classroom. The results of the trial are analyzed together with a team of learning experts and then improvements are made to the weaknesses of the LOGIC learning model. The trial process is held twice to obtain valid and reliable data. After the second trial and all validation processes are carried out, then the LOGIC learning model is determined (*Listen, Observe, Gather, Identify, Create*). The last stage is to disseminate the findings of the model so that it can be used by lecturers and teachers directly in the classroom. This product development research was conducted at Mahasaraswati University, Denpasar.

RESULTS AND DISCUSSION

This study applies the ADDIE instructional design method which begins with Analysis of existing problems, then continues with Design to compile instructions to overcome the problems encountered. Then the design is developed (Develop) by adjusting the needs and targets of the model to be achieved. Furthermore, the model that has been developed is tested (Implement) and then the test results are evaluated (Evaluate).

The research instrument used was a questionnaire to determine students' responses and reactions to the LOGIC model as well as lecturers' responses to the use of the LOGIC model in giving assignments or projects.

Analysis

The problem found that initiated the preparation of this instructional design model is the fact that in assignments, students often submit work that does not match the initial request. For example, in the Academic Writing course, only 13% of students are able to complete the final assignment according to the provisions that have been set at the beginning. While the rest submit assignments that do not match the request. This shows a gap between the instructions given and the acceptance of student understanding (Schillings *et al.*, 2018).

The analysis of this problem can be caused by two things. First is the delivery from the lecturer that is not clear and appropriate, so that it causes confusion on the part of the students. Second, this is also caused by the students who do not understand the instructions given, and are reluctant to confirm.

Differences in levels of understanding according to learning model theory can be caused by differences in learning styles. According to Walter Burke Barbe who developed the theory of modalities of learning, there are 3 learning associations, namely Visual, Auditory and Kinesthetic (VAK). This theory was then further developed by Neil D. Fleming into VARK, namely Visual, Auditory, Reading/writing, and Kinesthetic.

Those who are classified as visual *learners* , absorb and retain information better when the information is presented in visual form such as pictures, diagrams, charts, photos or videos. While *auditory learners* feel more helped in understanding information when presented in a presentation, hearing directly and repeating the explanation given by the lecturer or tutor. Learners with this learning style get more benefits in lectures or discussions. Learners with a *reading/writing learning style* tend to understand information better when they read the information directly. Learners of this type are also able to make summaries of information in the form of written notes. Kinesthetic learners prefer learning activities that involve physical activity. They can remember and respond well when they can move directly, touch or feel something.

Although criticism of learning styles *arises* on the basis of dynamic changes experienced by humans, and there is no one definitive learning style that can represent one learner. However, according to researchers, by presenting all aspects of visual, auditory, reading/writing, and kinesthetic in giving assignment instructions, a person can better understand the information given and the information they get in various exposures can complement each other.

Design

Departing from the problems and theories that have been described above, the researcher tries to design an instructional design to accommodate all learning styles and facilitate the gap between lecturer delivery and student acceptance. For that, the LOGIC learning model is designed.

Listen indicates the first activity that must be done is to listen to the explanation given by the lecturer well. For Auditory learner types, this will help them understand the information or things they have to achieve.

Observe means showing objects can be in the form of images, diagrams, flowcharts or videos, to help students understand instructions that were previously given verbally. Visual learners will benefit from the help of images, diagrams, or videos.

Gather is the next activity carried out, namely gathering/collecting information. Students can form small groups to share and confirm information they have previously obtained. Kinesthetic and auditory learners can benefit from this group discussion activity. In this group

activity, additional materials in the form of texts or readings can also be provided or sought so that students who enjoy receiving information through *reading/writing* can be accommodated.

Identify is a follow-up activity where students are asked to sort and identify important information that they can use to complete the demands of the assigned task.

Create is the final step where students will combine all the information obtained through listening, observing, discussing and identifying the things they need to be able to complete the tasks given according to the request.

Develop

After the model design is formed, development is carried out by asking for expert opinions on the suitability of the syntax for giving assignments or projects. The criteria assessed are the visibility of the learning model to be applied in class, clarity of syntax, suitability of the learning model to theory and needs in the field. The experts who were asked for opinions were lecturers who had more than 10 years of teaching experience. There were three expert lecturers involved in providing an assessment of this LOGIC learning model. The results of the three lecturers used as expert judges can be seen in Table 1.

Table 1. The results from expert

Aspect	Expert 1	Expert 2	Expert 3
Fit of model to theory	In accordance	Very suitable	In accordance
Clarity of implementation syntax	Very clear	Clear	Clear
Visibility of implementation within the classroom	Very suitable	Very suitable	In accordance

From the table above, it can be seen that all expert judgments after assessing the description of the LOGIC model stated that this learning model is in accordance with the theory being proposed, namely the learning style theory. The expert panel also stated that the syntax described in the LOGIC model is quite clear and very suitable for application in the classroom (Santos & Serpa, 2012).

Implement

After receiving input from experts, if necessary the model will be revised according to the suggestions and input from experts. Furthermore, this instructional design model will be tested in the classroom to see the response of students to the implementation of LOGIC. There are 53 respondents who have filled out the questionnaire on the implementation of the LOGIC learning model. The responses from students to the implementation of the LOGIC learning model are as follows.

Based on the questionnaire results, 58.5% of respondents strongly agreed that when working on assignments they need to listen to instructions clearly and see live examples. When we delved deeper into what things could help them understand the task further, here are the results we got.

Based on the responses from students, the things that they think can help them understand the tasks they have to do in sequence are by seeing clear examples of work, listening to instructions clearly, and asking the lecturer directly have the same percentage, namely 24.5%. Furthermore, respondents consider that providing clear work steps (13.2%) and discussing with friends (7.5%) help them in doing the requested tasks. This indicates that clear syntax for

working on tasks and the opportunity to exchange ideas with fellow friends help them in making it easier to do the tasks assigned to them. Furthermore, in terms of compiling assignments, students need clear instructions, examples and adequate information.

As many as 84.9% of students agree that with clear instructions, examples and adequate information, they will be able to complete assignments more easily. This is in line with the LOGIC learning model that provides audio and visual input, and provides students with the opportunity to discuss gathering information before finally compiling the assigned tasks. The syntax for implementing this learning model is also very clear according to the prefix of each letter *Listen-Observe-Gather-Identify-Create.* Most of the respondents felt that the LOGIC learning model and its steps consisting of listening, observing, collecting information, identifying and working (making) were able to accommodate the important steps in completing assignments.mAs many as 54.7% of respondents strongly agree that the steps in the LOGIC model represent all the important steps in task preparation and as many as 34% of respondents agree with the statement. While only 9.4% and 1.9% of respondents feel hesitant and disagree.

This shows that in its application, the LOGIC learning model is able to accommodate the important needs of students in compiling and completing assignments, starting with listening to instructions clearly, seeing direct examples, discussing and collecting information, and identifying important information before finally compiling assignments well. Related to higher order thinking skills (HOTS), students stated that through assignment activities, both individual and group projects by applying clear syntax, they were able to improve their critical thinking skills. They believe that with clear instructions and directions, as well as adequate information, they are able to complete the tasks and create the assigned projects. The level of critical thinking that they go through before reaching the stage of creating something (*create*) is identifying and sorting (analyzing) which information they need to complete the tasks they have. Furthermore, compiling the information according to the commands or instructions requested. From the questionnaire results, 39.6% of respondents agreed while 35.8% strongly agreed that their critical thinking skills were sharpened through project assignments. As many as 17% of respondents felt hesitant and around 7.6% of respondents disagreed (Hartikainen *et al.,* 2019).

It has been explained previously that the LOGIC instructional design model emerged from the fact that in completing assignments, both individual and group projects, it often does not meet the expectations or standards that have been instructed. This can be caused by various things, one of which is the student's learning style. Providing different inputs can affect information retention and each individual has different input preferences. By referring to the theory of learning styles, instructional design with the acronym LOGIC is structured in such a way as to accommodate various learning preferences. Based on the results of the model development and after consulting with experts, it was found that this learning model was in accordance with the referred theory, and the implementation in the classroom seemed feasible to be implemented, and the steps were in accordance with the important syntax in completing the assignment. After getting the results at the development stage, the next step was the trial stage.

In the trial phase, the results showed that the LOGIC instructional design model is very appropriate for the clear and structured stages of completing tasks. This model requires various information inputs starting from listening (audio), seeing directly (visual), discussing and collecting information, then identifying appropriate and important information to complete the task, and finally compiling the information that has been obtained to complete the task as

requested. Related to critical thinking skills, according to Bloom's taxonomy, it is marked by three top levels, namely, analyzing, evaluating/synthesizing, and creating . These three things have also been accommodated in the LOGIC learning model, where students before being able to work on/make/create something for their assignments, students are directed to collect information first (*gather*), before finally the information is analyzed or synthesized to sort and choose which is important and which is needed to complete the assignment. After that, the information that has been sorted and selected will be arranged to be able to complete the assignment according to what has been ordered. In more detail, the LOGIC application syntax can be described as follows:

Listen which is an initial activity where the teacher explains the instructions of the task to be done clearly and loudly so that students who tend to be audio types can receive the information well. The steps include:

1. The lecturer explains the purpose and objectives of the assignment to be carried out.
2. The lecturer explains the form or format of the assignment that the students will work on.
3. The lecturer explains how the assignment will be assessed and what students must do to get maximum marks.
4. The lecturer conveys the agreed deadline for submitting assignments.

Observe is the next activity to facilitate students who have a more visual orientation. At this stage, the lecturer provides clear visualizations in the form of images, pictures, video visualizations, graphs, posters, or examples that can be seen directly. This stage is very much in accordance with the requested task model. For example, the task is to make an essay, then the example shown can be an essay that is close to the desired quality. If the project requires a video-making assignment, then one example of a video needs to be shown as a reference to the requested standard. The steps in the observe activity include:

1. The lecturer shows images/videos that represent the desired standard of assignment completion.
2. The lecturer discusses one by one the aspects and qualities of each component of the desired assignment.
3. The lecturer provides a visualization of the steps for completing the assignment with an easy-to-understand flow diagram.
4. The lecturer gave students time to ask questions to better understand the examples given.

Gather is the next stage, where the lecturer gives students time to gather the information they need to complete the assignment. Gathering this information can be done in groups as well as a form of peer confirmation related to the assignment they are working on. The steps are as follows:

1. The lecturer allows students to work in groups to discuss their understanding of the assigned task.
2. If the task can be done in groups, they can start brainstorming *or* making a draft for the task they will be working on.
3. If the tasks being worked on are individual, then they can align their perceptions and help each other explain the tasks they are working on.

4. At this stage, the lecturer acts as a monitor and as a facilitator if during the discussion students experience obstacles or problems.

The next stage is identify. At this stage, after students have collected information both individually and in groups, they will identify which information is important to them and which information they choose to display in their assignments. The steps at this stage include:

1. Students are given time, either independently or in groups, to select the information they have obtained at the gathering stage.
2. Students sort and select important information that will be part of or a reference for completing their assignments later.
3. Students can present the results of the information they have selected in draft form.

The final step is to combine all the information that has been obtained and process it into a task that is in accordance with the provisions that have been conveyed at the beginning. At this stage is independent work or student groups to combine the information that has been obtained into a final product according to the request that was imposed at the beginning.

All the steps of the learning activities that have been arranged in such a way that they guide students to be able to develop critical thinking skills in a more structured way. Most respondents stated that assignments in the form of group or individual projects were able to improve critical thinking skills. This is because students are involved in three things that indicate critical thinking skills, namely analyzing information that is considered important in completing tasks, evaluating the progress of completing tasks, and working on tasks as final products.

The ability to evaluate and identify important information to determine what they need to complete tasks and projects. Then compile the information that has been obtained into the final form of the task or project as mandated. The mental and cognitive journey that takes place from the beginning of the task or project preparation process through the systematic steps of LOGIC is able to develop students' critical thinking skills.

CONCLUSION

The learning flow based on results or Outcome Based Education (OBE) requires students to be able to produce something either in the form of assignments or projects. However, in reality, the expectations of assignments given by lecturers are often not answered well by students. After conducting a survey and initial observation, it was found that the lack of clear instructions and examples of work and the steps for making them were the main obstacles to not achieving lecturers' expectations in assessing assignments and projects.

Therefore, the LOGIC instructional design was born, combining learning style theory and Higher Order Thinking Skills (HOTS). With the LOGIC flow, students are systematically guided to be able to produce assignments or projects that are in accordance with the provisions that have been set. After being developed in such a way, the LOGIC model is then tested to get direct feedback from students.

The results of the survey show that the implementation of the LOGIC model is very appropriate for the flow of work assignments and is also able to develop critical thinking skills. Because the learning steps are orderly and systematic and the input instructions are clear both visually and audio-visually, student acceptance becomes more complete. With the discussion

and identification steps, students can share, confirm, and complement each other's information that has been received.

SUGGESTIONS

Based on the research results that have been described in the previous chapter, several suggestions can be formulated as follows:

1. Lecturers/teachers can apply LOGIC steps to be able to guide students in improving their critical thinking skills.
2. For other researchers, this can be a source of reference regarding learning strategies in directing critical thinking skills.

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