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The Effectiveness of Flipped Classroom Model in Improving Higher-Order Thinking Skills

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Abstract:

Background: This developmental study was urgent to conduct not only to improve the students' Higher Order Thinking Skills (HOTS) but also to design Flipped Classroom (FC) model and develop a valid, practical, and effective FC model

Materials and Methods: The study adopted Thiagarajan, Semmel, and Semmel's model, which was modified through four stages: defining, designing, developing, and disseminating. The research subjects were all ten grade students joining the Crafts and Entrepreneurship subject and the teacher teaching the subject in Senior High School 1 Gowa. Expert judges rated the learning model and media. Data were collected through Focus Groups Discussion (FGD), Interviews, Documentation, Questionnaires, Checklist, and Scale. Data were then analyzed descriptively.

Results: Data analyzed using front end analysis technique shows that the approach implemented by teachers in teaching Crafts and Entrepreneurship subject was teacher-centered, limiting students to think creatively so that the learning was less effective in achieving the target. In the observation, we found that teachers carried out the learning activities mainly with one-way talk rather than inviting students to discuss the material that allows them to build their creativity and innovation, especially to improve their Higher Order Thinking Skills (HOTS). Teachers mostly implemented the conventional methods instead of the philosophical constructivism-based approach.

Conclusion: This study found that the FC model and learning media we designed and developed, followed by limited trial and validation by experts, were valid, practical, and effective. We also found that after implementing the Flipped Classroom (FC) model, students improved their HOTS. It means a significant correlation exists between the Flipped Classroom (FC) model and the improvement of students' cognitive skills

Key Word: Development, Flipped Classroom model, HOTS

Date of Submission: 14-10-2022

Date of Acceptance: 30-10-2022

I. Introduction

Higher Order Thinking Skills (HOTS) is a solution for a common problem faced by graduates. Societies, especially when recruiting a worker, usually complain about the quality of the graduates for their poor creativity and innovation. Although they are academically excellent, they tend to be monotonous thinking so that rather than initiating an action, they will usually wait for instruction before performing something at work. Consequently, it isn't easy to create and implement a plan independently. (King et al., 2016) and (Sani and Abdullah, 2019) defined HOTS as thinking widely to find a new challenge, implementing new information or older knowledge, and manipulating information to obtain possible answers in new situations.

How do prepare graduates with HOTS? One of the strategies is to provide learning activities with Flipped Classroom model. The flipped Classroom learning model is also known as reverse classroom learning because the activities start from home, which is different from traditional learning that begins at school (Bergman, J. & Sams, A, 2012). In traditional learning, students receive material from teachers through teacher talk or group discussion. They will then do some homework and submit it the next day. While by using flipped classroom model, students learn and analyze material at home using innovative media like video or e-books. Furthermore, they are asked to make a summary and make a note on important points that will be discussed in the classroom. It will stimulate students' creativity. Nederveld & Berge (2015) stated that activities normally conducted at school are carried out at home while homework is done at school. Therefore, to understand this learning model, we should first understand traditional learning (Wesley Baker, 2015).

Flipped Classroom learning model not only improves the higher-order thinking skills to accelerate innovation and creativity, but it is also relevant to be implemented in the industrial revolution era 4.0 as the model uses IT-based learning media like Artificial Intelligence (AI). For example, video and e-books. Teachers

produce the media at home and then send it using social media to the learners. It will then be used as learning media that will be discussed in the classroom. This illustration shows the Flipped Classroom model is not only innovative model development using Artificial Intelligence (AI) but also a model which reverses place. In this case, the activities previously conducted at home are moved to the classroom. This condition is considered a reverse learning model or Flipped Classroom (FC).

The IT or Artificial Intelligence (AI) based learning model is relevant to be applied in the COVID 19 pandemic and endemic era, which regulates the learning to be conducted online and offline or blended learning. This model is also useful to be applied by cities applying for an electronic programs like smart city and smart education. *This model also contributes to the policy "Merdeka Belajar Kampus Merdeka (MBKM)" because it can improve the Higher Order Thinking Skills (HOTS), which is highly necessary in the work world of industrial revolution 4.0.* One of the goals of MBKM policy is to link the university and the industry. The link and match program is expected to bridge the government effort to reduce the rate of unemployment with the companies' need for qualified human resources.

Studies about Flipped Classroom (FC) learning model have been widely carried out by researchers and experts like Sohrabi, B., and Iraj, H (2016) about the implementation of Flipped Classroom using digital media. Eppard J & Rochdi A (2017) discussed the framework and stages of implementing FC learning. Furthermore, Agustiningrum, A., & Haryono (2017) investigated the implementation of the flipped classroom and course review or ray-based on lesson study to improve the students' learning activities and outcomes. While earlier studies discussed FC in a more general context, the present research focused on implementing the learning model during the Covid 19 pandemic, which needed soft skills. Thus, the current study has novel urgencies. *The flipped classroom is a new learning model that emerged in the middle of the information and communication revolution called the 4.0 era.* It is because the instrument of the learning model mainly relied on network technology like video, which is one of artificial intelligence characterizing the post-modern society.

An interesting fact about the learning model is that it is an innovation that does not solely rely on the school as the place to learn but also on students' houses. It is different from traditional learning, which carried out most learning activities at school. That is why the learning model is called flipped classroom or flipped classroom teaching. To understand this learning model, we should first understand traditional learning (Wesley Baker, 2015). In traditional learning, students are taught by the teacher in the classroom (teacher talk, group discussion, reading, or observation) and asked to do tasks at home (homework). However, in a flipped classroom, students learn the material at home (by watching the video, summarizing, noting important points, making questions, discussing with their friends online, or reading necessary resources). In the classroom, there is also discussion, laboratory experiment, or explanation about concepts that have not been understood by students but only as supporting activities.

In the book *Flip Your Classroom: Reach Every Student in Every Class Everyday*, Bergman, J., & Sams, A explained the flipped classroom in detail. They mentioned that in the flipped classroom implementation, we allocated some minutes at the beginning of the classroom to discuss the video the students had watched the night before (Bergman, J. & Sams, A, 2012). One of the disadvantages of the reversed model is that students cannot directly ask the question which comes up in their minds. To solve the problem, teachers should spend much time at the beginning of the semester to train the students to watch videos effectively. Students are instructed to turn off their phones or other possible interferences while watching the video. Teachers then tell them they have the authority to pause and rewind their teachers. Students are pushed to freely use the pause button to make a note about important points in the lesson. Besides that, they are taught how to make a note using Cornell note-taking method. In this case, they should make a note, record their questions, and summarize the material.

In the next stage, they will receive a task after answering the questions they have prepared. The task can be a laboratory experiment, investigation, or problem-solving. The teacher will provide classroom tasks, laboratory, or tests normally found in the traditional classroom. However, teachers' role in the classroom dramatically changes. Teachers are no longer the information carrier but act more as tutors. They spend most of their time interacting with and assisting their students. In this case, the slowest students obtain the most intensive help from the teachers.

In facing the new habits due to the covid 19 pandemic, we need Higher Order Thinking Skills. Students should not only be taught to understand the material, but they should find information by themselves. Students with Higher order thinking skills will not only memorize a fact or transfer information in a similar form to the source. Higher Order Thinking Skills are defined as thinking widely to find a new challenge, implement new information or previous knowledge, and manipulating information to get a possible answer in a new situation (Sani, Ridwan, Abdullah, 2019; Butcher, C., Davies, C., & Highton, M, 2014).

Higher-order thinking skills are different from lower thinking skills which only memorize and deliver information similarly to how they receive it. HOTS requires someone to manipulate information and ideas to get new meaning and implications. Furthermore, Husna Nurdinni (2018); Syamsidah (2018) stated that higher-

order thinking skills involve critical and creative thinking on ideas of truth which has meaning. Critical and creative thinking have a mutual dependency. It also applies to criteria and values, reasoning, and emotions. Kuntari Eri Murti (2018), King, F.J., Goodson, L., & Rohani (2016) argued that higher-order thinking skills are a thinking approach not only by verbally memorizing facts but also by understanding the nature of the fact. To get meaning, the way we think should be integrated with analysis, synthesis, association, and conclusion to create creative and productive ideas.

Based on some opinions above, it can be concluded that Higher Order Thinking Skills are not only to understand information but also to describe and analyze it and even predict the possible facts. Therefore, by having HOTS, students are expected to be critical and creative in solving a problem. Benjamin S Bloom divided learning taxonomy into six categories: a. *knowledge*, b. *Comprehension*, c. *Application*, d. *analysis*, e. *synthesis*, and f. *evaluation*. Students' understanding abilities are categorized into some levels, from the lowest (C1) to know or remember to the highest (C6). The Bloom taxonomy has been implemented for a very long period of time to create an instructional design in education. Anderson and Kratwohl reviewed the taxonomy and made some revisions. C1 refers to know and memorize, C2 refers to understand, C3 refers to apply, C4 refers to analyze, C5 refers to synthesize, and C6 refers to evaluate (summarized by Afandi & Sajidan, 2017; Arends, R.I, 2015; Yackel, E., Cobb, P., Wood, T, 2013)

II. Material and Methods

The study employed Research and Development (R & D) design adopted from Thiagarajan, Semmel dan Semmel. It underwent four stages: defining, planning, developing, and distributing. Thiagarajan S., Semmel D., & Semmel M. I (1974). The research subjects were all ten grade students following Crafts and Entrepreneurship and material and teachers teaching the subject in Senior High School 1 Gowa. Furthermore, the judges were experts who would give rates on the learning model and media.

Data were collected through *Focus Group Discussion* (FGD) involving the school headmaster, vice headmaster for educational curriculum, and teachers of Crafts and Entrepreneurship. From this section, we obtain some data, including 1) the understanding, opinion, and experience about the phenomena related to the Crafts and Entrepreneurship subject, b) comment, readiness, need, and ideas about the development of Flipped Classroom learning media. Furthermore, we conducted interviews to obtain information and assess subject experts related to the content validity of the learning model and media. Besides that, some key informants (teachers) were invited for a product trial. After that, we documented the school policy of learning implementation, reports of teachers' activities, and format and instrument samples. The last was to distribute the questionnaire, checklist, and scales. It was to get information about research subjects' understanding of the concept of Flipped Classroom model development to improve students' HOTS. Besides that, it invited teachers and students to assess the acceptance, feasibility, and effectiveness of the learning model and material.

The qualitative study validates data by triangulating the sources and methods. The data are analyzed descriptively. Bogdan, R.C. & Biklen, S.K (2015). While the development of learning media used the 4D model (Thiagarajan S., Semmel D., & Semmel M. I, 1974) as follows: Defining stage consisted of 5 main stages, namely (a) front end analysis, (b) student analysis, (c) concept analysis, (d) task analysis, and (e) formulating the learning goals. The planning stage included (1) developing the concepts of the lesson plan, module, FC mode, and guide book, (2) selecting relevant references and media, and (3) choosing a format by reviewing available media formats which had been developed. The developmental stage aimed to create drafts of the FC model and media. That stuff was revised based on experts' input and data obtained from trials performed on its legibility. The limited trial was performed by students of Senior High School 1 Gowa who followed the Crafts and Entrepreneurship subject.

III. Result and Discussion

Defining Stage

1. Front End Analysis

Based on the observation, the learning approach applied by the teacher in the Craft and Entrepreneurship subject was generally a teacher learning approach so that students did not have a chance to think creatively, causing the learning ineffective to achieve the learning goals. We also found that teachers mostly talked when teaching and provided less discussion, which allowed students to be active, creative, and innovative, especially to boost their HOTS. He generally implemented a conventional method rather than a constructivist philosophical-based approach.

2. Analysis of Students

To review the characteristics of learners, we analyzed their basic understanding and skills in the Crafts and Entrepreneurship subject using a test and questionnaire. The results showed that the HOTS of students involved as subjects in this study was in the category "Started to Develop," and the learning outcome of the subject had an average score of 63.22 (out of the maximum score of 100). However, the result was not

enough to improve students' HOTS. It is estimated that students had lower thinking skills because of the conventional learning model applied by the teacher. Some teachers interviewed in the study stated that they usually carried out the learning activities one way as they believed it was the best method. They had not known about Flipped Classroom and HOTS.

3. Analysis of Concept

Crafts and Entrepreneurship subject discusses some basic competencies, including the basic concept of entrepreneurship, characteristics of entrepreneurship, business idea, opportunities, and analysis, administration resources and market of the local culture-based product, and component and stages of the business plan. The subject has different characteristics compared to other subjects. Therefore, the teachers should be creative in selecting learning models and materials. However, based on the interview conducted with the teachers, we found that they normally did not understand that the subject should be taught creatively and constructively. Thus they taught it using the conventional method with teacher talk.

4. Analysis of Task

The task was analyzed by testing students' knowledge and skills about the concept of Crafts and Entrepreneurship subject they learned. The tasks were how to solve problems related to Crafts and Entrepreneurship in real life through literature review or field experimentation. The first task asked students to make a group paper about a product's marketing strategy. The second task was to present the craft production system in front of other students and discuss the material with the teacher as the facilitator. As students enjoy discussing and sharing their ideas with their peers and teachers, they will be better at analysis, more initiative, easier to solve a problem, and better at presenting, which can improve their HOTS. Based on the observation, we found that students' ability to make papers, complete tasks, and do discussions was still low. It was because they could still not use HOTS in studying the concept of Crafts and Entrepreneurship.

5. Specification of Learning Goals

The specification was performed by adding the duration of activities inside the classroom (learning room and field). It was set under the constructive condition to allow students to complete tasks or projects in small groups. The process underwent some stages, including planning, acting, monitoring, and evaluating. It aimed to make students understand and have the skill to make a plan, implement, and evaluate so that they would have HOTS. Based on the observation and interviews, we identified that students involved as the research subjects had less understanding of how to do a project task, so they still had a low ability to plan, implement, and monitor a project. Based on the initial analysis, especially the defining stage (from point 1 to point 4), we determined the specification of the goals of Crafts and Entrepreneurship subject as follows: (1) Students understand the marketing strategy of a product, including the basic concepts of consumers, strategy in facing busing competitor, and the strategy to market a product. Furthermore, they should be able to present it in front of the classroom. (2) Students have their HOTS improved. (3) Students are independent, creative, and innovative.

Designing Stage

Analysis of the preliminary study became the basis for designing the learning model and material. It included a module, Flipped Classroom (FC) model, and lesson plan. The development of FC based learning model and media produced (1) FC model, (2) FC model lesson plan, which contained the details of learning activities in general and was developed based on the syllabus, and (3) Module of Crafts and Entrepreneurship subject. The three drafts (FC Lesson plan, Crafts and Entrepreneurship module, and draft of FC model) were validated by two experts of learning activities and one expert of learning material to measure the validity level and to give suggestions on the improvement of the learning model and media before it was brought into the field trial.

Development Stage

In this stage, we obtained the final product of the learning media and model after revising it based on the expert validator's inputs and data from trials. Stages followed in this step were:

1. Expert Validation

The assessment performed by the validator team on the learning media consisted of format, language, construction, and content. They suggested revising the learning model and media to make them valid. Three validators considered the learning media valid (with an average score of 4 out of 5).

2. Trials

Students trialed the learning model and media, which had been revised. It was to test some aspects related to using models and media in learning. Data obtained from this section were analyzed to be used as the bases to assess and revise the learning model and media before being distributed or disseminated. The limited trial showed that the FC learning model and media effectively and practically taught Crafts and

Entrepreneurship subjects. The practicality of Flipped Classroom model and media was indicated by the positive responses from three teachers of Crafts and Entrepreneurship users in Senior High School 1 Gowa. The learning media, including the Crafts and Entrepreneurship subject, lesson plan, and assessment instrument, got positive responses with an average score of 97.64%. Therefore, the model and media developed in this study were valid, practical, and effective to be applied.

Discussion

The findings above show that the Flipped Classroom (FC) model and media, including the design of the FC model, Crafts and Entrepreneurship module, lesson plan, and assessment instrument, were valid, practical, and effective. Based on the study, the students finally had their HOTS improve to become creative, innovative, and independent. The most important finding was that there is a significant correlation between the implementation of Flipped Classroom (FC) model with the improvement of HOTS indicated by students' ability to think critically, creatively, and innovatively and their understanding of the concept and application of the subject (Crafts and Entrepreneurship) also improved.

The improvement of HOTS and competencies in the Crafts and Entrepreneurship subject can at least guarantee that the students will be independent and not always rely on other people or the government. For example, when they face a problem in their life, they can find a solution or new innovation and even help others. Moreover, the knowledge and skills they obtained from the Crafts and Entrepreneurship subject can help them face future challenges.

It is in line with Sani and Ridwan Abdullah (2019) that HOTS will help students face a new challenges. Someone with HOTS can implement new information or knowledge and manipulate information to obtain possible answers because HOTS is different from lower order thinking skills, which only memorize or pass information exactly like how they receive it. HOTS is a thinking process that requires someone to manipulate information and ideas to obtain new meaning and implications (Wesley Baker, 2015; Husna Nurdinni, 2018) stated that HOTS involves critical and creative thinking guided by ideas of truth that have meaning. Critical and creative thinking are interconnected like criteria, values, reasoning, and emotion. According to Kuntari Eri Murti (2018), Siti Zubaidah(2019), and Afandi &Sajidan (2017), someone with *Higher Order Thinking Skills* (HOTS) will not only memorize information verbally, but they will also understand the meaning it contains. The process needs integrated thinking involving analysis, synthesis, association, and conclusion to produce creative and productive ideas.

Based on some ideas above, it can be concluded that HOTS is the ability to think by understanding information and describing, analyzing, and predicting. Thus, HOTS is expected to bring students critical, creative, and problem-solving skills.

IV. Conclusion

1. Based on the findings, teachers applied the learning approach in teaching Crafts and Entrepreneurship subjects so that students did not get a chance to think and create, which caused the activities to be ineffective in achieving the learning targets. We also found that some teachers still taught with teacher talk and provided less discussion, which was important to activate students and grow their creativity and innovativeness, especially HOTS. Teachers mostly implemented a conventional approach rather than a constructivist philosophy-based approach.
2. We have designed and developed a valid, effective, and practical learning model and media based on the validation by experts and trials. This study also shows that using the Flipped Classroom (FC) model improves students' HOTS. It means that there is a significant correlation between the Flipped Classroom (FC) model and the improvement of students' HOTS.

Acknowledgment

We thank the Ministry of Education and Culture and Educational Fund Management Institution (LPDP) for funding the research (Scientific Research, Lecturer Individual Research). We also thank the Rector and the Head of Research Institution of The State University of Makassar for providing facilities for the study. Lastly, we thank the headmaster, teachers, and students of Senior High School 1 Gowa for participating in the study

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