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Turkish Online Journal of Qualitative Inquiry (TOJQI)

Volume 12, Issue 6, June 2021: 4750- 4755

Research Article

The Potential of Adaptive Hybrid Learning Media Concepts in Empowering Students' Critical and Creative Thinking Skills

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Abstract

Critical and creative thinking is a need in education because it encourages students to gain an understanding of more complex information. The higher critical and creative thinking skills will lead students to find and conclude their understanding. It will facilitate convenience in the world of work. This study aims to review the potential of a hybrid learning media concept in empowering students' critical thinking abilities. Hybrid learning media extracts advantages from elements of learning styles, online-learning, and open-ended learning. The research method uses quantitative research procedures. The results of the study reveal that the hybrid learning media model has the potential to significantly empower students' critical and creative thinking skills compared to the conventional model.

Keywords: critical and creative thinking, hybrid learning media, empower

1. INTRODUCTION

By following Educational Law in Indonesia, students should be active in developing themselves according to their potential to usefulness in society. The ability base that students must have at present is the ability to think critically [1]. Learning based on critical thinking can support the empowerment of higher learning achievement, where students who have higher thinking skills will have better learning achievement than students with low thinking skills [2]. Good critical thinking skills lead to higher cognitive abilities in information processing [3]. Students who can explain concepts in their language are an indication that students have used their critical thinking skills [4]. Students who can communicate the results of their thoughts through sharing ideas with others also describe their social thinking skills as good [5,6]. Therefore, educators must be competent to empower students' critical thinking skills in the learning process.

Based on preliminary observation, the result of tests on 43 students participating in the Data Communication course in the Informatics Education Study Program of a university in Surakarta shows that the critical thinking ability is still relatively low. The analysis aspect, inference aspect, interpretation aspect, explanation aspect, self-regulation aspect, and evaluation aspect is still in very poor criteria, namely 40.01%, 40.67%, 39.53%, 38.35%, 37.18%, 41.25%, respectively. So this fact reveals that innovation in learning is needed to empower students' critical and creative thinking skills. Meanwhile, the student's creativity in the fluency aspect was 39.51%, flexibility aspect was 41.25%, the original aspect was 40.09%, and the elaboration aspect was 41.25%. All of them were very lacking criteria.

1.1 Elements of Learning Style

Learning styles/modalities are the preferred way by students in a learning process. With learning styles, students will more easily understand the lesson [7,8].

Theories that contain learning styles include cognitive learning theory and accelerated learning theory. The learning style adheres to modern cognitive science. It reveals that the best learning involves emotions, the whole body, and all senses. Furthermore, this theory focuses on respecting the individual learning styles by realizing that people learn in different ways. Not everyone uses the same way in learning [9].

1.2 Elements of Online Learning

Online learning allows flexibility of access, from anywhere and anytime. It guarantees to save time and space in the learning process [11]. According to [12], online learning has many advantages, but it must be done and supported by high commitment and adequate resources. [13] argued that online learning must have high authenticity (students must learn in the context of a work environment), high interactivity, and high collaboration. Many terms have defined online learning. [14] define online learning as learning that presented on a computer. Meanwhile, [13] define online learning as an innovative approach to providing instruction to learners who are far away and using the web as an intermediary medium. All of these terms imply: 1) there is a certain distance between learners and educators/instructors; 2) use some form of computer-based technology to access teaching materials as well as to interact with educators/instructors and other learners.

1.3 Elements of Open-Ended Learning Approach

The open-ended learning approach is an open learning approach that gives individuals freedom to develop various ways and strategies for solving problems according to the abilities of each student [15]. Open-ended problem-based learning provides sufficient space for students to explore problems according to their abilities, talents, and interests.

2. METHOD

This paper is a literature review sourced from both primary and secondary sources published from 2015 to 2020. This study also describes the data obtained from observations of the level of critical thinking skills of 128 undergraduate student teacher candidates from one of the largest private universities in Surakarta, Indonesia. Data collection through tests using several instruments and questionnaires. The results of interviews with experts support the idea of the need to empower students' critical and creative thinking skills. Finally, this paper signals to develop the innovation in the learning process. The main theories have inspired and become the basis for the alternative concepts in the learning process, namely the hybrid learning model.

The effectiveness of the concept is tested using an application called adaptive hybrid hypermedia (AHH). The testing process will be performed in the future research stage. This application has been hosted with the domain gayakubelajar.com and can be accessed openly by students to support the online learning process during the Covids-19 pandemics.

3. RESULTS AND DISCUSSION

3.1 The features of the elements

Experts divide several learning styles into different types. According to [10], learning modalities are divided into four categories, namely visual, auditory, read/write, and kinesthetic (abbreviated as VARK). Students with a tendency to visual modalities generally enjoy using visual media such as diagrams, graphs, flow charts, and models that represent visual information. Auditory students prefer information that is heard, so the best ways to learn are through discussions, lectures, talking to oneself and others. Read/write students prefer words and textbooks as a way of getting information, so they prefer textbooks, lecture notes, handouts, lists, and glossaries. Furthermore, students with kinesthetic tendencies will use a combination of sensory functions. They must experience or live their learning experiences, preferring practical simulations and real experiences, lessons that emphasize doing an activity, travel, exhibitions, samples, case studies, and role-plays.

Online learning has several common features which base on a combination of several theories and approaches that support online learning [11]. The first is individual learning. Learners create learning experiences by themselves. One of the advantages of online learning is that students can design their learning atmosphere that is comfortable and desired. Several internal and external factors will affect the success of online learning

conducted by students. Internal factors that can influence include intelligence, high curiosity, motivation, and personality. External factors are the technology used, the surrounding environment, the speed of internet access, and so on. The second is structured and systematic. Before holding online learning activities, educators need to prepare a syllabus, subject matter, media, and learning resources. All of these activities are in a structured manner. In addition, to being technically structured, the subject matter is arranged in such a way as to be structured according to the level of ability. The third is to prioritize the activeness of students. Online learning requires an active attitude from students. Educators using technology can design several activities that can make students active, active in thinking and actively socializing, and in other matters. The fourth is connectedness. Even though online learning is known as independent learning, it still allows for meetings between students even though at a distance. Online learning does not change the habits that occur in conventional learning, such as friendships or interactions with educators. So that one of the characteristics of online learning is connectivity.

In solving open-ended problems, students need to improvise in developing methods or approaches that vary in obtaining the correct answer. On the other hand, students not only answer but also explain the process to achieve these answers. Open-ended learning can help develop creative activities and critical thinking patterns and provides opportunities for students to investigate various strategies and ways with the elaboration abilities of students [16].

Students who are faced with open-ended problems in their learning activities are intended not only to get answers but also to emphasize how to arrive at an answer. So that it is not only with one approach or method in getting the answer, but also with several or many methods. The goal is that students' critical thinking skills can develop optimally and at the same time the creative activities of each student facilitated through the learning process.

Based on the literature review, a new concept that includes VARK learning styles, online learning, and open-ended learning approaches can be summarized as presented in Table 1 below.

Table 1. Concept maps for the elements of VARK learning styles, online learning, and open-ended learning.

MATERIAL LEARNING	
VARK	• Learning materials are in the form of visuals, audio, text, and simulations.
Online learning	• Well-structured and scheduled learning materials that can be accessed at any time if needed. • Learning materials also can be reviewed anytime and anywhere as long as there is an internet connection.
Open-ended learning	• The learning material begins with the presentation of an open problem.
STUDENTS	
VARK	• Train and develop the potential of students • Provide direct experience to students. • Able to involve students maximally to find and understand an activity concept. • Students who have good abilities not influenced by other students • Gives good learning outcomes when the learning style is appropriate
Online learning	• Students can become more active in the learning process. • The ability to learn independently increases so that the quality of education does not depend on educators.
Open-ended learning	• Students participate more actively in learning and more freely express ideas. • Students have more opportunities to utilize knowledge and skills comprehensively. • Students with low abilities can respond to problems in their way. • Learners are intrinsically motivated to provide evidence or explanation. • Students have a lot of experience to find something to answer problems.
LEARNING PROCES	
VARK	• Learning takes place more effectively according to the learning character of students
Online learning	• There is an electronic moderating facility where educators and students can communicate with each other easily and quickly.

	• Can discuss anytime through a portal or forum on the internet between educators and students. • Learning activities carried out anytime and anywhere as long as internet access is available • Does not require a specific room for face-to-face and shortens learning time (time and cost efficiency). • Attendance monitoring and assessment are done more easily from the activeness of students participating in learning activities.
Open-ended learning	• The learning process with analysis, finding answers through many ways and methods to encourage critical attitude and creativity. • It is possible to raise additional problems during the search for answers. It will construct the knowledge and experiences of students.

3.2 Adaptive Hybrid Hypermedia (AHH) Concept

The elements of learning styles, online learning, and the open-ended learning method approach are the main elements of hypermedia learning designed in this study. The excellent features of each of these elements are combined to create a new learning medium. It is adaptive hybrid hypermedia. Each element donates its superior characteristics for learning media that empower students' critical and creative thinking skills. The diagram of the learning process using adaptive hybrid learning media is presented in Figure 1 below.

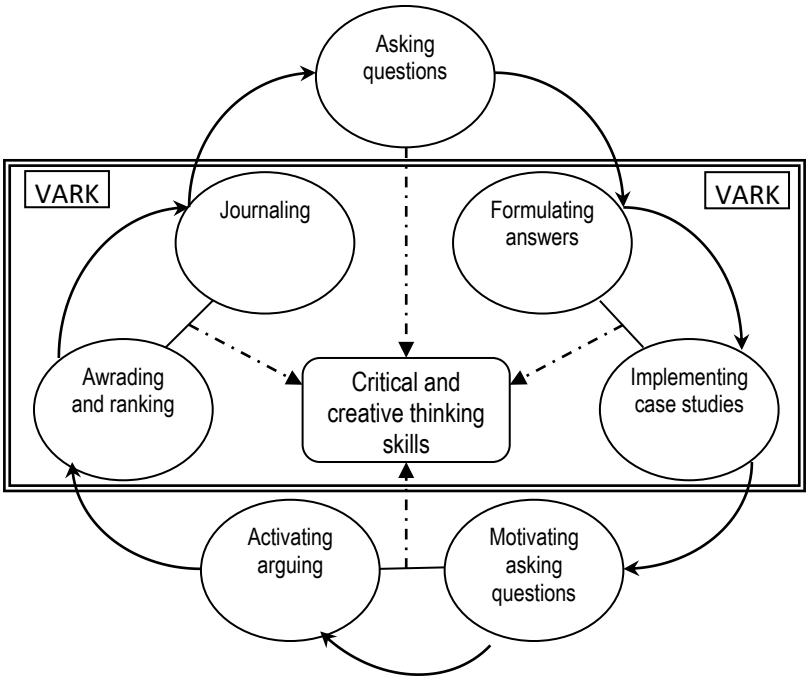

Figure 1. Diagram of the learning process with adaptive hybrid hypermedia

Activities in the learning process using adaptive hybrid hypermedia are described in Table 2 below.

Table 2. Matrix of learning activities in adaptive hybrid hypermedia.

Asking questions	
Objectives: - Students are motivated to explore the unknown and then make a cognitive relationship with the known and seek clarification. - The search for answers results in creativity and cognitive skills in seeking new information and	Activities: - Students think through a process of deductive and inductive reasoning. - Students internalize critical thinking habits while conditioning them to use creative thinking behavior patterns through guided practice.

transformation of knowledge through analysis and logical reasoning and questions that generate new questions.	
Formulating answers	
Objectives: - Skilled students give their opinion based on lecture content using own word. - Encourage the development of the habit of coming up with a variety of ideas in a flexible manner - Explore cognitive skills in logical analysis and reasoning.	Activities: - Students formulate answers to existing questions in their own words. - Students who cannot formulate answers in their own words can use the words of the authors they read but must be quoted.
Implementing case studies	
Objectives: - Motivate students to apply content concepts to case studies, published articles, or special assignments that require decision-making or problem-solving. - Give students the opportunity to practice certain types of critical thinking processes required for certain types of content concepts.	Activities: - Students receive lecture content and apply the content into interconnected chapters. - Students apply scores to the criteria and give students higher scores for successful application. - Students practice specific types of critical thinking processes required for certain types of content.
Motivating asking qusetions	
Objectives: - Facilitates effectiveness, novelty, and self-direction in critical thinking by generating additional information to improve reasoning, judgment, decision making, and problem-solving.	Activities: - Students ask questions about themselves, each other, and the instructor related to ambiguous content, words, or phrases.
Activating arguing	
Objectives: - Allows students to use all cognitive skills with an emphasis on analysis, logical reasoning, and discrimination. - Strengthen self-confidence, get used to critical thinking, and develop skills to articulate in front of an audience.	Activities: - Students get a topic and then submit arguments to be defended and respond to rebuttals from other friends. - Other students have the opportunity to argue with the arguments presented.
Awarding and ranking	
Objectives: - Motivating students to try to evaluate and organize themselves through assessment criteria for participation in discussions.	Activities: - Students receive learning rewards using a 5-point grading system, from 0 to 4. 4 is for excellent responses and 0 for unacceptable responses. Score 4, posts must be accurate, original, relevant, teach something new, and be well written.
Journaling	
Objectives: - Journaling evokes habits of reflection, piety, politeness, and wisdom in which can be measured in the choice of words and expressions found in individual students' journals. - Journaling allows developing writing skills and helps clarify thoughts and explore personal epistemology. - Reflective journaling also plays a role in developing cognitive skills in transforming knowledge to foster cultural competence and social responsibility.	Activities: - Students use the framework in a written journal to identify the thought processes they use in coursework, for example, determining the use of this type of diagnosis in deciding a particular problem.

4. CONCLUSION

Based on the literature review, this paper concludes that adaptive hybrid learning media consist of seven stages of learning syntax, including asking questions, formulating answers, implementing case studies, motivating asking questions, activating arguing, awarding and ranking, and journaling. The media model with the adaptive hybrid learning concept has the potential to be developed in a learning process that is oriented towards empowering students' critical and creative thinking abilities. The application of elements of learning styles,

online learning, and open-ended learning approach greatly supports and facilitates student learning, especially in the aspects of independence, creativity, and critical thinking.

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