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To cite this article: Muh Tawil and Ahmad Dahlan 2021 *J. Phys.: Conf. Ser.* **1752** 012076

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Application of Interactive Audio Visual Media to Improve Students' Creative Thinking Skill

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Abstract. This research intends to analyze the application of Interactive Audio Visual (IAVs) media to improve students' creative thinking skill of the Science Study Program FMIPA Universitas Negeri Makassar. The main purpose of this research is to obtain information: 1) characteristic of learning implementation by applying IAVs media, 2) characteristic of improvement of creative thinking skill of students who follow learning by using IAVs media and using Power Point (PPT) media and 3) the characteristics of student responses that follow the learning by using IAVs media and its supporting components. Designing mixed methods research, the embedded experimental model, the total population of 62 students of the even semester of 2017/2018 which is divided into group A of 31 students consisting of 15 fame and 16 male, who follow the learning by using IAVs media, and group B as many as 31 students, who follow the learning by using PPT media. Data collection techniques using observation, questionnaires and tests, the data were analyzed qualitatively and quantitatively. The results of the study were found: 1) all the syntax of learning by applying IAVs media was conducted in accordance with the planning, the students were more active both individually and in groups, social interaction among group members, students had no difficulties in operating the media; 2) the average score of creative thinking skills of group A students is higher than that of group B; 3) Students express interest, feel new, easy to use, interested, very clear media content and supporters. The media and its supporting components make it easy for them to understand the contents of light diffraction materials and to train creative thinking skills

Keywords: Media, Interactive Audio-Visual, Conventional, Creative- Thinking, Skills.

1. Introduction

In the 21st century (characterized as a knowledge society) other skills are needed in the labor market than before. Due to technological changes, increasingly complex and interactive tasks are expected to be completed by employees. Hence, it is essential that current students or future employees are properly trained for these new challenges in the labor market (like intense collaboration, communicating with others and solving difficult problems through creative thinking). The accompanying skills are called 21st century skills and the concept of 21st century skills are operationalized in [1] and includes collaboration, communication, problem solving and critical thinking. While learning these 21st century skills, the effectiveness of teachers plays an important role in order to get knowledge and skills across to students in their study. The central problem statement in

this thesis was: what is the effect of 21st century skills and teacher effectiveness in relation to student's preparation for the labor market in [2],

To address the above problems, the Curriculum of the Republic of Indonesia 2013, emphasizes the importance of students given training High Order Thinking Skills (HOTS) in [3]. It is stated in the Graduate Competency Standards, explicitly related to the ability of students to think for all levels of basic and secondary education is Demonstrate the ability to think creatively, logically, critically, and innovative and demonstrate the ability to analyze and solve problems in everyday life.

The findings from TIMSS (Third International Mathematics and Science Study) found that Indonesian VIII students were very low in learning achievement in Mathematics and Natural Sciences. Indonesia ranks 34th out of 45 countries in the survey conducted by TIMSS. TIMSS concludes if the education system in Indonesia has failed to provide value and skills to learners both in terms of process and output. Teachers in terms of parties are failing principally in improving the ability of learners in science and mathematics [4].

Why are students unable to meet TIMSS demands? TIMSS test items are pretty much wanting students to think, such as solving problems and investigating the natural world. Indonesian students have not or have little chance to learn and practice mastering the competence of thinking like that.

PISA 2015 research results (Programme International Student Assessment) say "*The approximately 6% of students across OECD countries who reported not attending any regular science lessons score 25 points lower than students who reported attending at least one science lesson, after accounting for the socio-economic profile of students and schools.*" [5]. Where it is known that Indonesia of the seventy countries under study of creative thinking skills, Indonesia in this study ranked in the eight lowest creative thinking skills that have been studied in various schools in Indonesia. This proves that the creative thinking skills of national students in Indonesia is still very low.

These findings are in line with the National Examination 2017/2018 results, finding that most students find it difficult to work out the problems, causing low national exam results [6]. Teachers should train their students to work on problems that require high-level thinking, so that students can solve various problems faced today

The mapping also found that in all levels of education, elementary, junior and senior high schools most teachers have formal thinking skills. One way to overcome this by using interactive audio-visual media in science learning. Some research results that support it, among others [7]-[9] found that the application of audio-visual media can affect student learning outcomes and student responses to audio visual media very well.

2. Literature review

2.1 Interactive Audiovisual (IAVs) Media

Audio-Visual" (multimedia)" when it refers to computer applications, they are meant to "*incorporate audio and video, especially interactively*", while when multimedia refers to art or education systems then it is implied that they are "*using more than one medium of expression or communication*". Interpretation of the word "Expression" and "Communication" used in the definition, signifies implicitly the existence of interactive processes. Communication in that respect may be considered as an interactive process between two parties that exchange information and evolve or change as a result. Today, multimedia is used to define an extremely wide area that includes the fields of informatics, telecommunications, the audio-visual production sector, cinema and digital media. In that respect, the term "Interactive Audio-Visual (IAVs) " is used to describe a scientific and creative research field within "Audio-Visual" that supports expression or communication through multiple media with the ability to influence and alter their content and context.

Interactive is used in conjunction to two people or things, it means they have an effect or influence each other. To extend the interactive definition further, this effect may be identified in the physical world, i.e. an action that may trigger a reaction, or a change of the user's mental state and

condition. Both conditions may also co-exist, particularly when the process is temporally examined. Take for example a painter who in order to create a painting interacts both mentally and physically when using the canvas, palette of colour and the appropriate tools. Although these processes stop for the artist when the painting is completed, the medium itself continues to instigate interaction when another person is influenced, inspired or moved by that painting. This in turn may result into a physical reaction expressed by the urge to capture the image or purchase a copy or the actual artwork, which may then be user as the starting point for new interactive behavior. Similarly, in New Media Arts this interactive process often involves multiple media.

The term "IAVs" may be used to describe a physical or digital system where multiple media or people have an effect on each other through their interactive behavior. When "IAVs" is used in fields such as art or education it implies the use of multiple media used for expression or communication and the existence of a dynamic user-state or content-altering capability.

In the computer industry, *multimedia* is a term used to describe the interaction of the human auditory and visual senses with the computer. A multimedia computer presents the user with many kinds of image-text, graphics, video, animation and several types of audio, including speech, music, and sound effects. The multimedia computer involves its user in many levels of interactive decision and control, altering the way information is conveyed [10]-[12].

The purpose of multimedia is to improve communication between computer and user and among users. Ideas may be expressed in many forms other than written words that are read sequentially. Image and audio may now be intertwined with the written word and presented interactively to readers. In this sense, multimedia is a new communication tool. The interactive nature of advanced multimedia presentations gives users control of the presentation and access to desired types of information. One user may want an overview of a topic. Each user may receive what is pertinent in a self-determined sequence. The user is in charge of the information flow and is not subject to the predefined ideas of the information provider.

2.2 Definitions of creative thinking that applied to the study

Understanding the creative thinking skills associated with this research is put forward in [13,14] that creative thinking is: …the process of 1) sensing difficulties problems, gaps in information, missing element, something asked; 2) making guesses and formulating hypotheses about these deficiencies; 3) evaluating and testing these guesses and hypotheses; 4) possibly revising and retesting them; and finally; 5) communicating the results".

Starting from the definition shows that creative thinking is a process of creativity, that is, feeling the existence of difficulties, the problem of information gaps, the existence of missing elements and disharmony, defining the problem clearly, making these allegations and the possibility of improvement, re-testing or even redefining the problem and ultimately communicate the results.

Creative thinking skills are associated with "imagination, independence, experimentation, holism, expression, self-transcendence, surprise, generativity, maleuticity and inventiveness provide descriptor of valuable characteristics of creative thinking and motivation, problem finding, ide finding, and evalutaion [15]-[17]. This definition emphasizes more on the characteristics of creative thinking such as imagination, experimentation, holism, expression, self-transcendence, surprise, generating, and inventiveness, with knowledge, motivation, finding problems, finding new ideas or ideas, and evaluating.

Starting from several definitions and indicators of creative thinking, then in this study is limited to the indicators of creative thinking, ie, create of variable, create of the problem, create a hypothesis, , test the hypothesis, and stated something different. This kind of research has been done in [18, 19].

3. Research Method

The research method applied is mixed methods research design Embedded Experimental Model [20] as in figure 1.
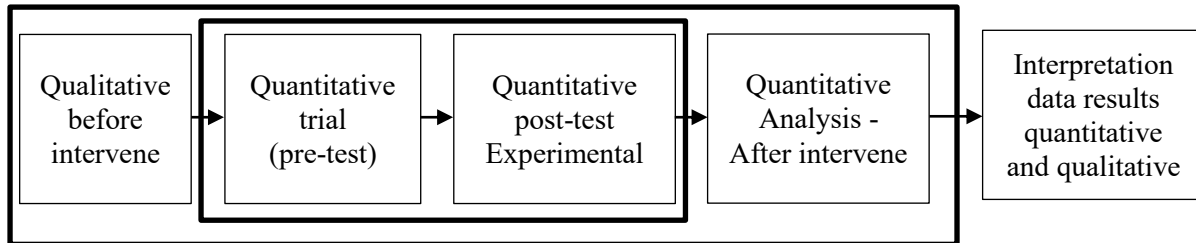
Figure 1. Embedded Experimental Model.

The embedded experimental model (Fig. 1) may be the most commonly used variant of the embedded Design [20]. This model is defined by having qualitative data embedded within an experimental design (such as a true experiment or a quasi-experimental). The priority of this model is established by the quantitative, experimental, methodology. This design can either be used as a two-phase, qualitative data can come before intervention, to shape the intervention, to develop an instrument, select participants, after the intervention (experimental and control group), to explain the results of the intervention or to follow up on the experiences of participants with certain types of outcomes.

4. Research Result

4.1 Characteristics of Student Creative Thinking Skills

Results of research on improving skills Student creative thinking by applying IAVs media and PPT media as in table 1 and figure 2.

Table 1. Improving Student Creative Thinking Skills.

Media Type	Improving	Category
IAVs	0.94	High
PPT	0.05	Low

The improvement of each indicator of students' creative thinking skill by applying the IAVs and PPT media as in table 2 and figure 3.

Table 2. Increased Average Score Indicator of Student Creative Thinking.

indicator of creative thinking skills	Increased average score	
	IAVs Media	PPT Media
creative of variable (CV)	0.99	0.41
creative of the problem (CP)	1	0.01
create a hypothesis (CH)	0.98	-0.01
test the hypothesis (TH)	0.97	0.01
stated something different (SSD)	0.78	0.08

The results of simulation we have obtained can not be manipulated the truth because if there are commands in the audio-visual media is not complete then the simulation will not be successfully displayed on the computer screen, so in this lesson indirectly train patience, thoroughness, diligence and honesty all of us in reporting the results of simulation programs that have been made.

The student response to the question "Are you interested in the appearance (writing, big letters, drawings, location of the picture, color) on light diffraction materials, IAVs media usage guidelines, student worksheets, and IAVs media content"? **Yes/ No**.

From this question the number of students who stated "**Yes**" as many as 31 people or about 100 percent. In general, they claim that light diffraction lecture material is interesting because it is newly found and full of innovations especially in teaching and learning activities. Setting the appearance of letters, writing, color, arrangement of images, equations presented systematically, regularly, a blend of colorful colors cause us very interested to read and learn the contents of the course materials, and guidelines use IAVs media and add spirit, our motivation to complete the task .

Students are easy to understand the course material, the content of the IAVs implementation guidelines and tasks, because all the learning materials we need are provided free of charge and can be learned at any time, we can discuss the lecture material with the group mates to be discussed by the lecturers with friends, at the time of college we only focus on materials that are not understood to be asked to lecturers. In this way, we do not experience many obstacles in following the learning, especially in making computer simulation of the tasks in the Sheet of student activities and doing evaluation problems.

Similarly, it is found that students are very interested if all the lecture materials use this kind of media and are very enthusiastic to follow the recovery if all the lecturers teach the course material, give guidance to operate the media and do the problems by explaining well. Students feel highly motivated by giving feedback of tasks that have been examined and they can know the advantages and weaknesses of the results of its performance. The assessment in a transparent manner also encourages the students to know more about the improvement of their capability in mastering the study material.

This finding is consistent with the results of the study in [21, 22].This study clearly shows that students exposed to audio visual method performed better and enjoyed this new way of learning. Audio visual aids provide significant gains in informational learning, retention and recall, thinking and reasoning, activity, interest, imagination, better assimilation and personal growth and development.

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