POWTOON-BASED ANIMATION WITH SCIENTIFIC APPROACH TO IMPROVE STUDENT'S CRITICAL THINKING SKILL IN PHYSICS LEARNING

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Abstract - This development research aims to (1) develop Powtoon-based animation that is suitable for use as an alternative to more effective learning media (2) Improve students' critical thinking skills in learning physics by using Powtoon-based animation learning media (3) Analyze student responses to the development of learning media Powtoon based animation. The research method used in this study is a development research method that refers to the ADDIE development model, namely Analysis, Design, Development, Implementation, and Evaluation. The researcher chose this method because the ADDIE development model was effective and dynamic so that it was deemed suitable to be used in the development of this research. The subjects in this study were 15 students of the physics education study program, faculty of teacher training and education, batch 2020 at the university. The instruments used in this study consisted of media expert validation sheets, physics lecturer validation, pre-test and post-test, as well as student response questionnaires to interactive physics learning media based on powtoon. Observational data were analyzed using the percentage technique while the results of the critical thinking ability test were analyzed using the normality test and t-test with the help of the SPSS application. This research is expected to help improve critical thinking skills by using learning media that are easy to understand, effective and innovative.

Keywords - Physics, Animation, Powtoon, Critical Thinking, Scientific Approach

I. INTRODUCTION

Currently, almost a lot of academics in the field of education are researching related to critical thinking skills, most argue that the main objective underlying education is the development of skills critical thinking [1]. Critical thinking is an ability that needed by every student that will be useful in life their personal and professional lives [2]. According to Zelaieta Antaand Camino Ortiz de Barrón (2018), critical thinking is a reflective activity that leads to action and to develop it students have to think about what they think [3].

Students can be said to have been able to think critically when they can speak using the right reasons, both logically and systematically to solve a problem [4]. Critical thinking skills can be seen from the value of student learning outcomes, in a study that carried out by arini and juliandi resulted in the average daily testvalueclass X-4 is 73.19. Although the value is still below the Criteria Minimum completeness(KKM) for physics subjects, which is 75, but the value of this is the most superior value, the cause of students not achieving grades KKM is that students are very difficult to understand various concepts in the material physics lessons, one of which is on vector material, so the teacher is very need a solution in overcoming students' difficulties in understanding the material[5].

Physics is a branch of science that requires students to have critical thinking skills to be able to understand it. Physics is a part of science. Science is the product of knowledge scientific, so the methods, processes, principles, attitudes and others must also be scientific. Therefore, learning physics in schools should also be done with scientific approach to be more significant in the minds of participants students and able to shape the attitude or character of students as well as improve students' understanding and learning motivation [6].

The curriculum currently being developed in Indonesia is learning based on a scientific and interactive approach. Basic Education Process Standards and Intermediate mentions the need for a learning process that is in accordance with the rules scientific approach [7]. Five aspects of the scientific approach are observing, asking, exploring, associating, and present. In the process of scientific approach, the teacher does aways to make students capable in the learning process, so that students able to think critically and creatively in solving problems at hand.In a study conducted by In'am and Hajar showedthat with a scientific approachcan make student learning outcomesgot the very good category [8].

In addition, physics is considered a difficult and boring subject because teachers tend to master the learning process by applying the method lecture. The lecture method makes the teacher dominate teaching and learning activities in the classroom to be passive towards students, and students learn more accept notes and memorize only, so that it makes studentsless happy to learn physics [9] so it takes media and appropriate and appropriate learning methods. *Nano learning* is one of the learning methods that are suitable for use in learning

physics.*Nano learning* is a method that presents ways to design,distribute, and utilize small elements of learning.Nano learning involves further miniaturization of learning[10].

Multimedia is a technology used to combine variousmedia forms related to text, graphics, images, still images,and moving [11]. This multimedia can be used as alearning media, the advantages of using revolutionary era learning mediaIndustry 4.0 will greatly assist teachers in reducing verbality and characterfrom the media is contability so that it allows students to learnanywhere and anytime without the limits of space and time independently [12].

Learning media can be used to overcomelimitations in delivering material [13]. One ofanimation-based video presentation software that can be used to createinstructional videois *Powtoon* [14]. *Powtoon* is an apponline web for creating animated cartoons or video presentations in the form ofeasy walk [15]. *Powtoon* is a softwareveryexciting and fun animations, presentations, videosbecause it is supported by the cartoon factor inthe application [16].

In a previous study conducted by Rio Arianto, Sri Kantun andSukidi obtained the results that the use of Powtoon media canimprove student interestand learning outcomes in basic competenciesdescribe the economic actors in the Indonesian economic system[17] the use of animation media has a significant effectto increase critical thinking and student learning activities [18].

II. METHODS

The type of research that will be researched is development research. Development research method is a method used in analyzing the need to test the effectiveness of the product so that the quality of the product to be produced can be known (muyasaroh). So in this study refers to the ADDIE development model because this model is very suitable to be applied in the development of learning media animations that will be developed. ADDIE stands for Analysis, Design, Development or Production, Implementation or Delivery and Evaluations [16].

1. **Analysis stage;** The analysis consists of two stages of assessment, namely needs assessment and aspect analysis assessment. The first analysis is an analysis of students, the media to be used, the material to be taught, and the available technology. Then design the product to be developed.
2. **Design stage;** Based on the analysis that has been done, the learning media design stage is carried out. This stage aims to make the initial design of the learning video which is still in conceptual form and will be realized at the development stage. Learning videos as a medium to help the powtoon application.
3. **Development stage;** After designing the product design, the next step is to collect supporting materials such as the content of the subject matter, backsound and others and then produce animated learning videos using the Powtoon application.
4. **Product Implementation stage;** After the product is finished it will be revised and includedat the Powtoon video product validation stage and material validation by experts. If the product hasdeclared eligible by the experts, then continued with the implementation of Powtoon videos to students and providing questionnaires related to student responses to the products that had been developed.
5. **Evaluation stage;** After testing the product, it will be analyzed and revised again if there are errors. The achievement of research objectives was measured from the data obtained through student response questionnaires and expert validation. In the big picture of this model, the process needs to be more centered on the design of the media to be developed[19].

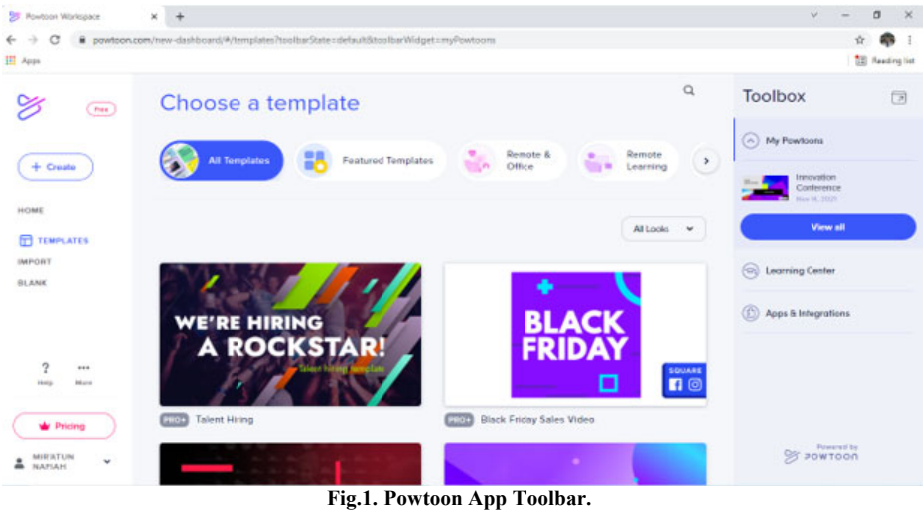

Fig.1. Powtoon App Toolbar.

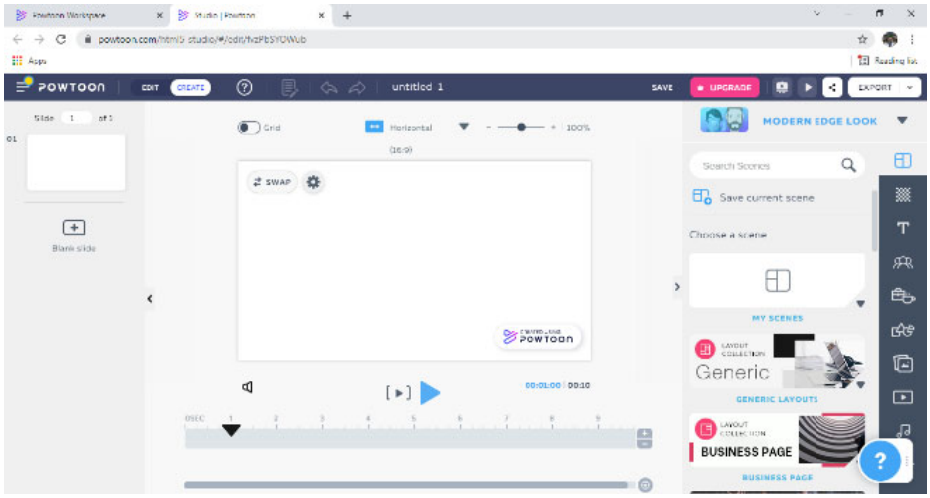

Fig.2. Powtoon App Studio To Make Animation.

III. RESULTS AND DISCUSSION

One other alternative that teachers can do to support learning objectives to be achieved is to develop learning media. Therefore, teachers are required to be more creative and innovative in developing learning media, especially digital-based learning media. Learning media are everything that is used in learning activities in order to stimulate students' thoughts, feelings, interests and attention so that the process of educational communication interaction between teachers (or media makers) and students can take place effectively and efficiently [20].

One of the most effective learning media is audio-visual media. Audio-visual media is media that can display image and sound elements simultaneously when conveying messages or information. Audio visual media plays an important role in the educational process, especially in the teaching and learning process. Learning media can be used to overcome limitations in delivering material, [13]. One of the animation-based video presentation software that can be used to create learning videos is Powtoon [14].

Powtoon is a web-based online application program that functions as a video maker application for presentation and learning media. Powtoon learning media is one of the audio and visual-based learning media. Powtoon is an animation, presentation, video software that is very exciting and fun because it is supported by cartoon features in the application [16].

There are several advantages in making Powtoon audio-visual media, including: 1) Its use is practical, it is easily accessible through the www.powtoon.com website without having to download an application 2) There are many choices of background templates so that in the worksheet you only need to insert images, text, audio and videos to be used as teaching materials. 3) Animated content, fonts and transition effects are available. 4) Display attractive, dynamic and interactive. 5) Can be saved in MPEG, MP4, AVI format or directly shared on YouTube. 6) The resulting product is a learning video that can combine images, videos, and audio. [20]

Besides having advantages, powtoon also has disadvantages, including: 1) It is an online application that requires internet to open it. 2) Limited duration 3) To save requires internet with a stable speed because the end result is a video that has a large memory capacity. 4) For unpaid powtoon users can only export files to files that require internet to open them. 5) Unpaid Powtoon users can only export files to YouTube, if they want to save they can download files via YouTube [11].

In this study, the learning media that the researcher developed was a very fun learning medium because because it was unique by combining some funny and interesting content, here is an example of how the product looks:

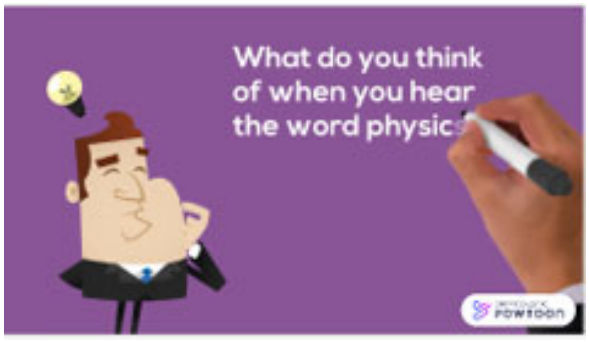

Fig.3.Animated Video Products Made Using Powtoon.

In this study, researchers will apply the concept of nano learning so that the duration of the learning video is quite short. One's learning power after 30 minutes had decreased. He suggested that the teacher take a break for a few minutes [21]. Students' attention increases in the first 15-20 minutes, then decreases in the second 15-20 minutes, and then

increases and decreases again. Meanwhile, the tendency to decrease attention occurs in parallel with the applicable length of study time [22]. Reviewing this day, it is felt that the concept of nano learning will be able to provide a more effective and enjoyable learning impact. nano-learning strategies, as well as community-based learning where users learn through shared design and sharing of knowledge and enhance collaborative learning between users. By applying the concept of nano learning, it is possible that learning activities will further encourage student involvement so that students will be more active and creative [10]. Because in this study the content of the subjects discussed is physics, the researchers combine existing concepts with a scientific approach where this approach is very suitable for studying physics.

In a previous study conducted by Rio Arianto, Sri Kantun andSukidi obtained the results that the use of Powtoon media canimprove student interestand learning outcomes in basic competenciesdescribe the economic actors in the Indonesian economic system[17] the use of animation media has a significant effectto increase critical thinking and student learning activities [18].

According to the findings of Syaiful Arif and Amalia Nur Muthoharoh, it was found that the mediapowtoon is feasible to implement, helps facilitate understanding and improvestudent representation ability [12].From the results of research validation conducted by F Bakri at all (2020) shows that this learning video with the help of Powtoon is feasible to be used as a learning medium that can support fun. Learning [14].

By looking at previous studies that have been validated, it can be seen that there are many advantages that can be generated by utilizing Powtoon animation-based learning media.Therefore, it is hoped that this animation based on Powtoon can also be used to improve students' critical thinking skills in learning physics, by applying the nano learning system and using a scientific approach. so that it will realize a physics learning process that iseasy to understand, innovative and effective. It is hoped that this research can provide benefits for the world of education, where at this timethe world of education is experiencing a decline in quality caused by the COVID-19 pandemic.

IV. CONCLUSION

Education is very important in human life, which means education cannot be separated from reasoning and critical thinking skills. Critical thinking is an ability that needed by every student that will be useful in lifetheir personal and professional thinking Critical thinking is an ability that needed by every student that will be useful in lifetheir personal and professional. An alternative that can be used to support education is to use good learning media. One of the unique and fun learning media is Powton.

Powtoon is a software very exciting and fun animations, presentations, videos because it is supported by the cartoon factor in the application. by using animation based on Powton learning with the scientific approach is expected to improve thinking skillscritical of students in learning physics

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