Development of Computer-Based Learning Media (Digital) Tutorial Model to Improve Physics Learning Process in the Pandemic Era (Covid-19)

Tia Listiani*, Nurhasanah1, Rahmat Hidayat1, Saosan Alamuna H1, Tasya Septiana1, Wisnu Watin1, Zahratul Walihah1, Susilawati1

1Department of Physics Education, FKIP, University of Mataram, Mataram, Lombok, West Nusa Tenggara, Indonesia.

Abstract: The purpose of the research from the results of the review of 25 journals is to determine the feasibility of computer-based (digital) learning media that can be used by teachers as learning media using a tutorial model. Research from the results of a review of 25 journals uses the R&D (Research and Development) method that produces products from researchers. Based on the results of the reviews of several journals, the average percentage of eligibility from the validation results of material experts, media experts and test results can be said to be in a good category and feasible to use, so that it can be used as a reference for prospective teachers to increase knowledge in learning techniques, improve learning outcomes, and motivate students in the learning process in the Covid-19 era.

Keywords: Computer-based learning media; Learning process; Research and Development (R&D) model; Pandemic (Covid-19).

Introduction

Along with the development of the globalization era which is characterized by the production of rapid use of information and technology, the concept of implementing learning has shifted towards efforts to realize modern learning (Diani & Syarlisjiswan, 2018). Since its early development in the 1920s, educational technology has always been associated with multimedia equipment. This development by Dorris is referred to as the enrichment of education through the seeing experiences (Yusuf, 2012). Multimedia can be interpreted as a combination of graphics, text, sound, video, and animation. This merger is a unit that together displays information, messages, or lesson content (Azhar, 2011). In line with that, Dale estimates that the acquisition of learning outcomes through the sense of sight is around 75%, through the sense of hearing 13% and through the other senses around 12% (Riska, 2014).

Educational technology, also known as instructional technology (instructional technology) is an applied field of study that exists as an integrated effort to help solve unsolved learning problems with a pre-existing approach (Januarisman & Ghufron, 2016). Information and Communication Technology in the current era of globalization has become a basic need in supporting education (Sutopo, 2012) which has a positive impact on the world of education, especially computer technology which plays an important role in supporting learning activities, for example through the development of computer-based learning media. The use of computers as media in the learning process has been widely carried out and developed in the form of computer-based learning media (Yusuf, 2015). This learning media can be used online by utilizing the internet network or offline which does not require internet network access. Syam (2017), states that media

*Corresponding Author: tialistianialbahri46@gmail.com
Department of Physics Education, FKIP, University of Mataram, Mataram, Lombok, West Nusa Tenggara, Indonesia.
is a messenger technology that can be used for learning purposes.

According to (Arda, et al, 2015) himself, the media is one of the factors that support the success of the learning process in schools because it can help the process of delivering information from teachers to students or vice versa. Creative use of media can facilitate and increase learning efficiency, as a result learning objectives can be achieved and students can understand the material easily, therefore media can be interpreted as various types of components in the student's environment that can stimulate them to learn (Hiedayat and Sulistyowati, 2010).

Learning media has a very strategic function in learning activities, thus making it one of the factors that can increase students' understanding of learning materials. One of the media that can be developed to support learning activities is a computer-based learning media with a tutorial model. The tutorial model learning media is in great demand because this tutorial model can guide students in carrying out learning activities independently. Syam (2017), states that learning guidance tutorials in the form of providing direction, assistance, instructions, and motivation so that students learn efficiently and effectively. Providing assistance means helping students in learning the subject matter.

At the end of December 2019, the world was shocked by the news of a disease whose symptoms are similar to pneumonia whose cause is unknown. The acute respiratory infection that attacks the lungs was detected in the city of Wuhan, Hubei Province, China. Since January 3, China has regularly notified WHO and related countries and regions such as Hong Kong, Macau and Taiwan about the pneumonia outbreak. On February 12, 2020, WHO officially designated the disease as Coronavirus Disease (COVID-19). COVID-19 is caused by SARS-COV2 which belongs to the same large family of coronaviruses that causes SARS (Maya, 2020).

Various policies have been issued by the Indonesian government to reduce the level of spread of the corona virus by imposing social distancing, physical distancing to implementing PSBB (large-scale social restrictions) in several areas. The policies issued to limit the spread of COVID-19 have an impact on various fields throughout the world, especially education in Indonesia (Herliandry et al., 2020).

Based on this background, the formulation of the problem in research from the results of a review of 25 journals is how to develop interactive learning media based on computer tutorial models to improve the learning process in the pandemic era (Covid-19). The goal to be achieved is to determine the effectiveness and success of using computer-based media in the physics learning process.

**Method**

The research method in this article reviews 25 journals in which they use a development known as Research and development, namely research that produces certain products and tests product feasibility. The development model used adapts Borg and Gall's (1983) development research procedures. Sampling was done randomly (randomly). The sample was divided into two groups that were chosen randomly (Margareta, 2019).

The use of development procedures, starting with conducting preliminary research and gathering information, planning, developing the initial product form, conducting material and media expert reviews, revising the product in accordance with the suggestions and test results of material and media expert reviews, conducting trials individual, small group trials, large group trials, revision of the final product in accordance with the suggestions and results of field tests, disseminates and implements the product.

The data from this research are in the form of responses from media experts, material experts and students to the quality of the products that have been developed in terms of appearance, programming. Learning and content or material. Data in the form of comments, suggestions for revision and the results of observations of researchers during the trial process were analyzed descriptively qualitatively, and concluded as input to improve or revise the products that have been developed. Meanwhile, the data in the form of response scores of media experts, material experts and students obtained through questionnaires were analyzed descriptively quantitatively with percentage and categorization techniques.

**Results and Discussion**

During the current Covid-19 pandemic, all learning processes are carried out online (online), so educators are required to be creative in delivering material through online learning media. There are several learning media that can be used in the online learning process. In research conducted by researchers, researchers created one of the learning media, namely tutorial-based learning media with a personal computer. Computer-based media is an interactive medium of direct learning for learners. Making learning media using computers using Power Point Presentations (Sabah, 2019), Google Sites, macromedia flash Viajayani, et al. (2013) and others. This is because Power Point Presentations (Sabah, 2019) or Google Sites can combine various information in one place, namely videos, presentations, attachments, text, and more and can be shared accordingly.
to the user's needs. The material used in this research is Physics.

The results of the research conducted by Ma’sum, (2014) obtained the results of research through three stages of trials, namely the first stage (individual) trial, second stage (small group), and third stage (classical or field). Based on the results of the analysis of research from Ma’sum, (2014), it was found that there was a fairly high increase in the value of 48.75%, so that Physics learning media can be said to be effective in increasing the achievement of student learning outcomes. The results of the research show that 24 students have achieved completeness and 8 students have not achieved completeness or 75% of students have achieved completeness and 25% of students have not achieved completeness. The results of the assessment analysis on one-on-one trials, small group trials, and field trials showed the very good category. On the humanistic and material aspects, the average score on the one-on-one trial was 3.72; small group trial 4.16; and field trial 4.28. In the aspect of media attractiveness, the average score on the one-on-one trial is 3.73; small group trial 4.18; and field trial 4.24. The average score of the overall product test assessment is 4.05 with a very good category. This shows that the products developed are of high quality.

The data obtained from Ma’sum's research, (2014) showed that the learning media developed had a positive effect to be used as a teacher’s tool in learning physics in high school, it was proven to increase the percentage of students' learning mastery and from the affective aspect, students seemed enthusiastic, happy, enthusiastic, and motivated to take physics lessons. small group trial 4.18; and field trial 4.24. The average score of the overall product test assessment is 4.05 with a very good category. This shows that the products developed are of high quality. The data obtained from Ma’sum's research, (2014) showed that the learning media developed had a positive effect to be used as a teacher’s tool in learning physics in high school, it was proven to increase the percentage of students' learning mastery and from the affective aspect, students seemed enthusiastic, happy, enthusiastic, and motivated to take physics lessons. small group trial 4.18; and field trial 4.24. The average score of the overall product test assessment is 4.05 with a very good category. This shows that the products developed are of high quality. The data obtained from Mansur's research, (2019) showed that the learning media developed had a positive effect to be used as a teacher's tool in learning physics in high school, it was proven to increase the percentage of students' learning mastery and from the affective aspect, students seemed enthusiastic, happy, enthusiastic, and motivated to take physics lessons.

Research conducted by Rahma and Fatimah, (2020) shows that the results of the validation of material experts, media experts and the results of field trials in the development of multimedia learning physics on dynamic electrical material obtained through 3 stages, namely on material validation on aspects of learning, material and aspects media is in the good category with a percentage increase from 14.29% to 85.72%. The development of computer-based learning media carried out by Rahma and Fatimah, (2020) shows that the interactive physics learning media for high school students developed is feasible to be used as a learning resource and is able to improve student learning outcomes, as evidenced by the completeness achieved by 71.43% of completeness. from 14.29% to 85.72%. Based on the results of observations, students look enthusiastic, happy, motivated,

Research by Arda et al., (2015) shows that the results of material expert validation on all aspects were assessed at 3.55 in the very good category and the media expert assessment at 3.10 in the good category. The development of computer-based interactive learning media that was developed using macromedia flash 8 and the Borg and Gall development model has been feasible to be used as a learning medium to improve conceptual understanding. This can be seen from the results of expert validation on all aspects of 3.55 and the media expert's assessment of 3.10 with good categories.

Research by Anggit and Ika, (2017) obtained the results of the analysis that the results of material experts, media experts and educators with an average score of 3.60 respectively; 3.37; and 3.94. Meanwhile, the students' responses to the science learning media during the limited trial and the wide trial had the same criteria, which were rated Good (B) with an average score of 3.22 and 3.10, respectively. The development of computer-based interactive learning media that was developed is feasible to use but still needs to be developed.

Research by Ekawati, et al., (2012) at the individual trial stage showed the video tutorial media in the good category with a percentage of 77%. Furthermore, in the small group trial stage, the video tutorial media showed a good category with a percentage of 81.08%. The results of the large group test of 30 students showed that the media was included in good criteria with an assessment of 86.87%. In individual trials, the results of the pre-test obtained an average value of 55.56 and the results of the post-test obtained an average value of 86.87. So that there is an increase in student understanding which is indicated by a gain value of 0.70. In the small group trial, the pre-test results obtained an average value of 52.78 and the post-test results obtained an average value of 81.39, so there was an increase in student understanding as indicated by a gain value of 0.61. In the large group trial, the pre-test results obtained an average value of 51.67 and the post-test results obtained an average value of 80.67. Based on these results, there is an increase in students' understanding which is indicated by a gain value of 0.60. The results of the evaluation of material
experts on the aspect of the feasibility of the content/material, the media that has been made is included in good criteria with an assessment of 80%. The results of media expert validation on the media feasibility aspect, the media that has been made is included in very good criteria with an assessment of 96.30%. From these data, the percentage is 83.10% for the good media category as a medium, 84.23%. As a media to help students learn independently in small groups, and 81.19%. As a good medium in improving students in independent learning. 67 and the post test results obtained an average value of 80.67. Based on these results, there is an increase in students' understanding which is indicated by a gain value of 0.60. The results of the evaluation of material experts on the aspect of the feasibility of the content/material, the media that has been made is included in good criteria with an assessment of 80%. 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The data obtained by Rahma and Fatimah, (2020) research results were obtained from questionnaires from educators and student responses, validation questionnaires from material experts, media experts, and informatics experts. The results obtained from material experts 87.45%, media experts 83.61%, informatics experts 77.29%, and educators in three schools 87.77%, while the response of students in three schools was 82.43%. Based on the assessment of material experts, media experts, informatics experts, and educators, it can be concluded that physics learning media using computers in the form of websites is suitable for use as learning media.

The results of the research from Putri, et al. obtained from data collection of learning media validation using an assessment instrument with a Likert scale. The results of this development research in the form of software with Augmented Reality technology on the subject of Optical Instruments. This Augmented Reality-based multimedia learning media goes through a validation test phase with an average percentage of achievement of 90.54% according to material experts, 91.42% according to learning media experts, and 97.26% according to high school physics teachers. The results of the limited trial by 7 students of SMA Negeri 22 Class X showed the percentage of achievement of 87.70% and the results of the field trial of 33 students of SMA Negeri 22 Jakarta in class X and 28 students of SMA Negeri 33 Jakarta in class XI showed the percentage of achievement of 86.43 %.

The results of research from Rante, et al on the quality of multimedia products based on the aspect of display quality are good with a percentage of 83.3%, from the attractiveness aspect it is good with a percentage of 82.6%. Average 82.95%. The expert's assessment of the material contained in the multimedia
from the aspect of the material is good with a percentage of 81.3%, in terms of the linguistic aspect it is good with a percentage of 79.2%, from the aspect of presentation it is good with a percentage of 81.9%. Average 80.8%. Thus, it can be concluded that the quality of the multimedia developed is good for use in learning dynamic electricity materials in junior high schools.

The results of research by Margareta on student learning outcomes were obtained from 4 meetings, which were calculated using the SPSS application. The results of the SPSS calculation of the experimental group showed the value of \( t = 29.583 \) with a significant value \( = 0.000 \), because the significant value \( = 0.000 <0.05 \). The magnitude of the increase in the average learning outcomes is 43.3. The results of the SPSS calculation for the control group show that the value of the increase in the average learning outcome is 5,333. In addition, a comparison of the average learning outcomes of the two groups was also obtained. The average experimental group is 43.33 more than the control group learning outcome is 5.33 (\( \mu_1 = 43.33 > 2 = 5.33 \)) so that \( H_0 \) is rejected and \( H_1 \) is accepted. Based on the data from this research,

The results of research from Ekawati, et al, (2012) which were obtained from the results of validation to material experts and media experts, the video tutorial media developed met the appropriate criteria in terms of material and media, so that it could be tested on students. At the individual trial stage, the video tutorial media showed a good category with a percentage of 77%. Furthermore, in the small group trial stage, the video tutorial media was in good category with a percentage of 81.08%. The results of large group testing of 30 students showed that the media was included in good criteria with an assessment of 86.87%. So, there was an increase in student understanding, which is indicated by a gain value of 0.70. The gain value indicates that the video tutorial media for sound material is in the medium category and is effective as a learning medium. In the small group trial, the pre-test results obtained an average value of 52.78 and the post-test results obtained an average value of 81.39, so there was an increase in student understanding as indicated by a gain value of 0.61. The gain value also shows that the video tutorial media for Sound material is in the medium category and is effective as a learning medium. And in the large group trial, the pre-test results obtained an average value of 51.67 and the post-test results obtained an average value of 80.67. Based on these results, there is an increase in students' understanding which is indicated by a gain value of 0.60. The gain value also shows that the video tutorial media for motion material is in the medium category and is effective as a learning medium. The results of the evaluation of material experts on the aspect of the feasibility of the content/material, the media that has been made is included in good criteria with an assessment of 80%. The results of media expert validation on the media feasibility aspect, the media that has been made is included in very good criteria with an assessment of 96.30%. In individual trials, the percentage of learning independence questionnaires obtained was 83.10%. These results indicate that the video tutorial material Sound is in a good category as a medium to help students learn independently which is indicated by the emergence of aspects of independent learning. In the small group trial, the percentage of learning independence questionnaires obtained was 84.23%.

The results of research conducted by Yusuf, (2015) obtained through the results of expert evaluations of the resulting media products indicate that of the four aspects that must be met by a computer-based learning media, namely learning aspects, content aspects, programming aspects, and display aspects, on average all aspects have a value of 3.58. This shows that the validity of the resulting media products is in the very valid category. Based on the results of operational trials, it was found that the use of this learning media could help students understand the material about black body radiation. This can be seen in the results of the student material understanding test where the percentage of students who have an understanding level that is in the very good and good categories is 81.36%. The remainder, amounting to 18, 64% are in the category of a sufficient level of understanding, and there are no students who have a level of understanding in the category of less or very less. In addition, the results of the student motivation survey after using this learning media show that the percentage of students who have very high and high motivation levels are 94.73%, and 5.26% have moderate motivation levels. From these results it can be seen that there are no students who have a level of motivation in the low or very low category. This shows that this learning media product is feasible to be used to motivate students in the learning process. and there are no students who have a level of understanding in the category of less or very less. In addition, the results of the student motivation survey after using this learning media show that the percentage of students who have very high and high motivation levels are 94.73%, and 5.26% have moderate motivation levels. From these results it can be seen that there are no students who have a level of motivation in the low or very low category. This shows that this learning media product is feasible to be used to motivate students in the learning process. and there are no students who have a level of understanding in the category of less or very less. In addition, the results of the student motivation survey after using this learning media show that the percentage of students who have very high and high motivation levels are 94.73%, and 5.26% have moderate motivation levels. From these results it can be seen that there are no students who have a level of motivation in the low or
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The results of research conducted by Mansur (2019) were obtained from the results of a questionnaire on indicators of student attractiveness to the process of developing PBK media to continue to develop it further and transformed in the form of quantitative data showing the figure of 85% those students are interested in continuing to develop PBK media (computer-based learning). further by revising/updating it. The results show that PBK (computer-based learning) media is suitable to be developed.

The results of the study by Fatoni, (2016) were obtained from the results of the validation carried out by experts and teachers on the level of product feasibility in terms of material having an average value of 98.1%. The validation results for the level of product feasibility in terms of media have an average value of 98%. Based on the results of the validation carried out by experts and teachers, it was concluded that the average product assessment in terms of material and media was very feasible. The results of trials conducted on 11 students to measure the level of product readability had an average test score of 96.5% with a high readability level. The results of trials conducted on 11 students to measure the level of student response have an average percentage of assessment of 91.8% with a response rate of strongly agree.

Based on the results of Frenky, et al. (2015) The results of research on the development of interactive multimedia tutorial models for theoretical physics subjects in class XII SMA, it was found that from the expert review results with a total average percentage of 86.11% the learning media was categorized as valid. Based on the results of student responses obtained in the one-to-one evaluation stage, the average percentage was 93.83% and in the small group stage the average percentage was 84.25%, the overall average percentage was 89.04% with a very practical category. The interactive multimedia tutorial model for the subject of Atomic Theory physics in SMA class XII has a potential effect on student learning outcomes based on the N-gain obtained, which is 0.1 in the low category.

The results of research from Anggit and Ika, (2016), it is known that product quality based on the assessment of material experts, media experts and educators has a very good category (SB) with a consecutive average score of 3.60; 3.37; and 3.94. The student's response to the product in the limited trial and the wide trial was in the Agree (S) category with a mean score of 3.22 and 3.10, respectively. Based on this, the development of science learning media using Adobe Flash tutorial model for SMP/MTs class VIII.

The results of research from Octafiana, et al. (2018) the research resulted in a product in the form of interactive multimedia learning in science subjects. Based on validation data, multimedia experts obtained a score of 27 from an average of 2.70 with a good category although some improvements still need to be made. In the implementation phase, the results obtained, in individual trials, were 33 with an average of 3.30, and were said to be feasible. The small group trial obtained a score of 35 with an average of 3.50, and based on the feasibility test table it was categorized as ‘very good’. In the field test, based on data on the level of learning motivation, the results of the pre-test and post-test research in the experimental class were 6.1 and 8.8 while the control class was 60 and 6.1.

The results of research from Asyhari and Diani, (2017) with the R&D method, showed that the frequency of students surfing the internet was quite high, students were also aware of the importance of technology for learning. The product developed was then validated by experts, and the results showed that based on the learning management aspect, the developed media got a score of 91.67%, and in the collaborative learning aspect it got a score of 100%. Based on the results of validation by website design experts, it got a score of 89.6%, and student responses as test objects, the developed media got a score of 94.66%, and student responses to product expansion trials were 100%. Based on the stages carried out in this study, this learning media has very good quality and is suitable for use for students.

Research by Rustyaning and Artha, (2016) examinesclass VII students of SMP Negeri 1 Karanggeneng Lamongan, totaling 24 students. By using one experimental class VII-A and one control class VII-B. Based on the calculation of the results of the pre-test and post-test in the control group (class VII-B) and the experimental group (class VII-A) obtained t count with the value= 3.47 while db = 46 with a significance level at = 1.68 and at a level = 2.42. So, it can be concluded based on the test results it was found that the price of greater than the price and ie 1.68<2.42<3.47. This shows that the use of computer learning media in the experimental
group can improve student learning outcomes in the subject matter of heat class VII-A SMP Negeri 1 Karanggeneng Lamongan.

Conclusion

After reviewing the journals of 25 journals that went through the development stages using the R&D development model that had been carried out, the development of computer media for physics subjects was feasible based on media feasibility assessments for material experts, media experts, individual trials, small group trials, and large group trials. And large group trials fall into the very good category.

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