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Development of an Entrepreneurship Themed Animation Film of Kappaphycus Striatum Integrated Linear Programming Using the Plotagon Application

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ABSTRACT

Entrepreneurship is the answer to the challenge of the need for creativity and innovation in solving problems or creating new opportunities, as applied in vocational-based curricula. Various vocational competencies and skills are trained to equip and prepare students to enter the dynamic world of work so that students can solve problems encountered around them through creative problem-solving. Therefore, in its teaching, real problem-solving exercises are needed with the help of learning media that can illustrate these real problems in detail with very realistic visuals. Thus, this study aims to develop a valid, practical, and effective animated film to visualize realistic problems of entrepreneurial practice to improve students' creative thinking skills. The research and development model used in this research is the descriptive ADDIE model, which shows systematic steps to produce an animated film with an entrepreneurship theme. The basis for selecting this development model is related to the special characteristics of the ADDIE model, namely developing products to relate the gap between educational research and educational practice, as well as emphasizing specific problems related to practical problems in teaching through applied research. Animated films with the theme of entrepreneurial practices can meet the criteria for product development feasibility in terms of validity, practicality, and effectiveness. The animated film media used has also proven to be a solution to the problems of students who have not been trained to think creatively in solving entrepreneurial practice problems so that students are more enthusiastic about learning and have meaningful learning experiences.

Introduction

The digital revolution has an impact on paradigm changes from an industrial economy to a more digital economy and changes the way business-to-business (Bjorkdahl, 2020; Kraus, et al., 2023). In this revolution, technology is starting to be integrated so that it has great potential for local and global economies to become more productive and sustainable (Chauhan et al., 2022). Business actors must be able to be creative in creating new digitalization and capturing the value of market needs. Therefore, at this moment digital entrepreneurship will be a new business opportunity that can generate large commercial profits, especially related to the development of digital media and innovative technology (Baig, et al., 2022; Tang, et al, 2023).

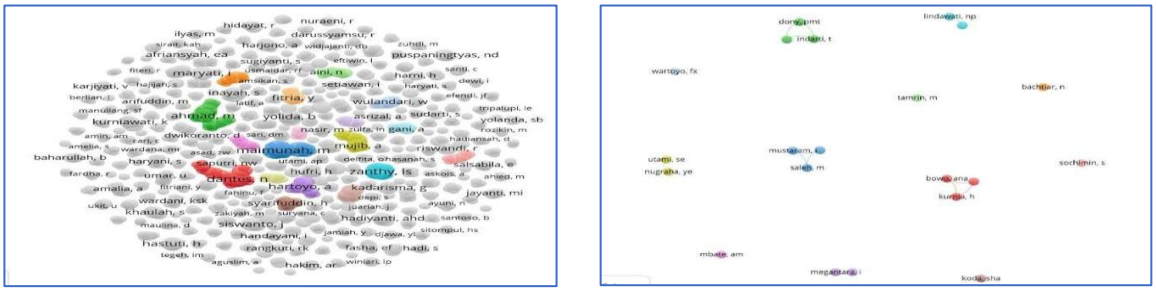
The ability to capture value and seek opportunities based on existing problems around is very much needed today and needs to be provided in preparing quality human resources. Preparation of this competency has been integrated with the implementation of a vocational-based curriculum that is closely related to the world of entrepreneurship. Through a vocational-based curriculum that provides skills training and is vocational in its educational process, it is hoped that students will obtain graduate competency provisions based on innovative entrepreneurship and be able to compete when they go directly into society. With these competencies, graduates are ready to become human resources who are not only looking for work but are also able to create jobs to answer the challenges of this digitalization era (Mardiana & Riyadi, 2023).

The results of widespread digitalization will not only influence future financial and inventive outcomes but will also have an overall impact on social and institutional conditions. The progressiveness and rapid progress of digitalization have contributed greatly to bringing global economic prosperity (Bakari, et al., 2022; Xu, et al., 2022). The significant contribution and influence are based on the high demand of society for digital technology in the last two decades, especially the need for technology that has produced many digital artifacts, digital platforms, and digital infrastructure development initiatives by public and private entities. In this case, digital platforms can offer many opportunities for business actors to develop their products. Product development certainly cannot be separated from creative and innovative abilities which are the basis for seeking and creating opportunities in facing life's challenges. This is in line with the important essence of entrepreneurship which is related to the ability to create something new and different (Klenner, 2022) which is carried out through a process of applying creativity in solving problems and finding opportunities to improve life (Diawati et al, 2023). The digital technology that will be developed as

an alternative solution to solving problems in this research is an animated film related to the theme of Kappapychus striatum seaweed entrepreneurship.

Regarding the ability to think creatively in entrepreneurship, the 21st century also demands the achievement of these competencies in various fields, including education. In higher education, the ability to think creatively is one of the competencies that needs to be equipped to face the demands of the world of work as socialized by the Ministry of Education and Culture (Kemdikbud, 2017; Arsantil, et al., 2021). This ability, which according to the Maine Department of Labor USA Career Center is very necessary in the future world of work, is also the goal of mathematics learning which is required of students in addition to finding and developing new ideas, reasoning, and thinking logically. By thinking creatively, students can generate various possible new ideas and broader solutions in finding problem solutions (Kusumawati & Andriyani, 2022; Hendriana, 2017). The importance of developing creative thinking abilities at various levels of education is because these abilities give rise to ideas and problem solutions that are relatively different from previous solutions (Aschauer, 2023).

Although the development of creative thinking skills is urgent, but several documented studies have shown that the achievement of creative thinking skills at the tertiary level is still low, including research conducted by Suripah & Sthephani (2017) which involved 132 students in Riau, research by Arilaksmi et al. (2021) which involved 35 students in Malang, as well as research by Arifani et al. (2015) which shows the diversity of students' creative thinking ability levels where 2.84% of students show very high creative thinking ability, 21.49% medium math ability, 29.75% low math ability, and 43.80% very low. This figure shows an indicator of the common ability to think creatively in Indonesia from year to year so that students are less able to think divergently in responding to problems in new situations that continue to develop rapidly. The low creative thinking abilities of students in Indonesia are recorded in the research results presented in Figure 1 below.



(a) Low creative thinking in Indonesia (b) Low creative thinking in Alor

Fig 1: Low level of creative thinking ability

Among the distribution of 988 studies on low creative thinking abilities in Figure 1(a) above, there are research results on low creative thinking abilities of students in Alor Regency in 2019-2022 which is around 1.21% of the total research in Indonesia as in Figure 1(b). Then how to improve the low creative thinking skills in Alor Regency in terms of the causative factors? Facts in the field discovered by Nugroho (2023) and Kartikasari et al. (2022) state that the low creative mathematical thinking ability of students in Indonesia is caused by several factors including students not yet accustomed to solving problems using various alternatives; lack of student involvement; as well as the lecturer learning model which tends to explain the material more. As a result, students only imitate what the lecturer does and are accustomed to providing solutions using routine procedures (Sarassanti & Mutazam, 2019; Dhungana & Thapa, 2023; Subanji & Nusantara, 2022).

As an educational institution at the highest level, higher education should have a crucial role in equipping its students with relevant skills and competencies to enter the workforce or become entrepreneurs. Amidst the competition and demands to live independently, it is necessary to improve life skills based on vocational skills for students to be ready to face the dynamic and problematic business world (Rizky, et al., 2023). Therefore, students need to be trained to be able to solve problems creatively and not always use routine problem-solving procedures.

Students' low creative thinking abilities related to problem solving have a significant impact on students' thinking processes to reveal new possibilities and open up other points of view through unexpected ideas (Zulkarnaen, et al., 2022). In this case, students are less able to generate new ideas and solutions to solve problems and are less able to think of appropriate ways to handle a problem, mobilize resources, and evaluate values (Hadar & Tirosh, 2019). The ability to think creatively allows students to make changes, combine, utilize, and create new or different information (Kusumadewi & Kusmaryono, 2022). Students are required to carry out activities that manifest effective thinking to produce a product or solve a problem in their way (Arsantil et al, 2021). They must hone their creativity in various things and innovate to find new things that are different from existing ones, including solving local wisdom problems in Alor Regency.

Alor Regency is a district in NTT province with potential marine resources that have not been managed optimally, one of which is seaweed (Kappapychus striatum). Based on participatory data from the WWF Indonesia Foundation in 2021, Alor Regency has a potential seaweed cultivation area of 53,787 ha, but only 12.55% of the total area has been utilized. Seaweed cultivation activities in Alor faded and almost stopped in the period 2003-2004, so the cultivators switched to other livelihoods. Kappapychus striatum is generally sold to local village collectors or outside the area at

a relatively low price because it does not go through processing. Until now, seaweed processing in Alor Regency is still very simple in-home industries only. Seeing the various challenges faced by Kappapychus striatum cultivators, an optimal processing solution is needed. This is where the important role of students is needed to be able to innovate using their creative thinking skills in contributing to solving problems around them.

The requirement for achieving students' creative thinking skills need to be balanced with the selection of learning models that can be oriented towards achieving these abilities and one of them is Problem Based Learning (PBL). PBL is a learning model whose main point is to present complex real problems that require more than one solution so that students can think critically, systematically, logically, creatively, and collaboratively in the solution process (Junaedi, 2019; Wahida & Andriyani, 2022). This model can be integrated with various student-centered problem-solving approaches so that it can improve creative thinking abilities, including with the help of learning media that can illustrate problems, improve the quality of learning outcomes, and HOTS abilities (Andriyani & Suhendri, 2019; Marhaeni et al., 2021; Suryani et al., 2020; Dasilva et al., 2019). One media that can accommodate this and can help realize experiments pay attention to new patterns, suggest solutions to problems, and illustrate them well is animated films (Aditiya, 2022; Larin & Mayer, 2018). This animated film is also a cultural work of art created to convey information to the general public through a series of continuous and synchronized fast-moving images to stimulate students' creative thinking abilities (Safitri et al., 2020).

Previous research only revealed an increase in creative thinking abilities with the PBL model (Mahendrawan et al., 2022), but no one has specifically revealed an increase in creative thinking abilities with media that can convey information to the general public. Previous research also only revealed the effectiveness of animated films (Safitri et al., 2020), but no one has revealed their use in mathematics learning which is integrated with the theme of solving problems around local wisdom. Meanwhile, the update in this research is the use of a PBL model which is focused on the context of the real problem of cultivating Kappapychus striatum whose processing has not been optimized in Alor. This PBL model with animated films is a reference for lecturers to help students improve their creative thinking skills in solving problems around them. Thus, the purpose of this study is to develop a valid, practical, and effective animated film based on the PBL model to visualize realistic problems of entrepreneurial practice to improve students' creative thinking skills.

Method

The research activities carried out in this study are broadly the development of animated films as a supporting lecture that meets the validity of both material and media aspects, the application of a practical Problem-Based Learning (PBL) model with a starting point of lectures through providing problems of processing Kappaphycus Striatum entrepreneurial products in animated film screenings, and testing the effectiveness of its application in improving students' creative thinking skills. The R&D design with the ADDIE model has a development procedure consisting of 5 stages, namely:

a. The analysis stage consists of a literature study and a field study

   This stage is a stage that has been carried out by researchers. In this stage, the researcher has conducted a literature study related to the variables studied, both from theoretical studies and the results of other studies. Apart from that, at this stage, the researcher has also conducted field studies consisting of initial field observations at a College of Teacher Training and Education in Nusa Tenggara Timur, interviews with the lecturers and tests of creative thinking ability. The creative thinking ability test is measured using 3 indicators fluency, flexibility, and novelty. The average aspect of student fluency reached a score of 15,23; the average flexibility aspect reached a score of 13,45; and the novelty aspect achieved a score of 10,29. From the details of the achievements above, it can be concluded that students' creative thinking skills at the higher education level still need to be improved, especially in the aspects of fluency, flexibility, and novelty. This is also supported by the results of observations and interviews with students, and lecturers which show that there is still a lack of students' ability to create creative ideas with various solutions to contextual or real problems related to everyday life.

b. Design stage

   After the researcher conducted an initial analysis of the needs at this university, the researcher planned to design a learning model for a course that includes the context of optimization of real-world problems and entrepreneurship problems, namely the linear programming course. Linear programming is a course that integrates the fields of mathematics and economics to study optimization techniques and modeling of real-world problems related to everyday life. In this research, researchers also plan to design animated films to support learning. Apart from that, the researcher also prepared research instruments and determined the population and sample.

c. Development stage

In the next plan, at the development stage, the researcher will validate the instrument, validate the animated film and the learning model, as well as revise according to the suggestions from the validator until everything that is designed is suitable for use with a valid category.

d. Implementation stage

The next plan is that at the implementation stage, the researcher will implement and collect field trial data at a College of Teacher Training and Education which is the place for the research trial. Data collection for trials and research on a small scale will be carried out on 16 first semester students of the 2022/2023 class, while trials and research on a large scale will be tried out on 54 other students at a College of Teacher Training and Education for 3 months.

e. Evaluation stage

Finally, at the evaluation stage, the researcher will analyze the research data by categorizing the validation results, categorizing the results of user responses, testing the hypothesis with paired sample t-tests, and re-designing digital devices and learning models. At this evaluation stage, researchers will also make conclusions and further suggestions for further development which will be compiled in research reports, both progress reports and final reports.

Data collection methods consist of non-test methods (interviews, observations) and creative thinking ability test methods given before and after treatment with animated films. Data collection instruments are in the form of animated film product validation questionnaire sheets by material experts and media experts, student response questionnaires, and creative thinking ability test question sheets. The animated film product validation questionnaire sheet is used to obtain validity data, while the student response questionnaire sheet is used to obtain practical data. Differently, the creative thinking ability test instrument given before and after treatment with animated films is used to obtain effective data. The data that has been collected is analyzed using qualitative and quantitative analysis. Qualitative data analysis to determine the validity of the product is carried out by calculating the average validation score and then converting the average data into the qualitative validity category. Likewise, the practicality aspect, which is known through the analysis of the average student response score converted into the qualitative practicality category. The guidelines for determining the conversion of quantitative data to qualitative data on a scale of 5 (five) for validity and practicality refer to Widoyoko (2018). Meanwhile, the effectiveness analysis is carried out by processing the results of the ability test before and after treatment with animated films. If the paired samples test value is > 0.05, then H0 is accepted so that the animated film product improves

creative thinking skills and vice versa. *H*0 is a condition where the average score before treatment is the same as the average score after treatment so that there is no significant difference between the average scores before and after treatment.

Result and Discussion

This research is basic research with a research and development (R&D) design that uses the ADDIE model. This study aims to develop animated films as learning support, apply the Problem-Based Learning (PBL) model through animated films with the theme of the Kappaphycus Striatum ecosystem, and test the effectiveness of its application in improving students' creative thinking skills. R&D design with the ADDIE model has a development procedure consisting of 5 stages.

a. Analysis stage consisting of literature study and field study

At this stage, the researcher has conducted a test on preliminary research. Researchers have conducted a trial in preliminary research. The results of the trial showed the level of students' creative thinking ability as measured using 3 indicators of creative thinking ability, namely: fluency, flexibility, and novelty. The average score for each aspect respectively was 15,23 for the fluency aspect; 13,45 for the flexibility aspect; and 10,29 for the novelty aspect. These results indicate that students' creative thinking skills at the higher education level are still low and need to be oriented towards improvement. The low level of students' creative thinking ability is also supported by the results of observations and interviews which lead to the need for an integrated learning device for a particular learning model to train students in creating creative solutions to contextual and real problems around them.

b. Design stage

After carrying out an initial analysis of the existing needs in the College of Teacher Training and Education, the researcher designed media and learning models which are especially developed for the linear programming course as one of the integrated courses in mathematics and economics to study an optimization technique and modeling real-world problems. Chosen this course in line with the opinion of Rafflesia, et al (2014) that linear programming is closely related to real problems that are modeled as a mathematical model. The media to be designed is in the form of an animated film filled with real problems faced by the people around Alor, namely the low level of sales of raw seaweed of the Kappaphycus striatum type due to lack of competitiveness which affects the welfare of the surrounding farmers. So, it is necessary to develop seaweed processing entrepreneurship to increase the selling price of seaweed that was previously sold raw. Seaweed processing is an effort to increase the competitiveness value of seaweed sales through various new processing techniques. Adding value through various combinations of new techniques is included in students' creative thinking abilities. This is in line with what was conveyed by Drucker and Zimmerer who view that

in entrepreneurship there is creativity, innovation, and the ability to solve problems and explore opportunities. In the Entrepreneurship Education Development Curriculum Center, 17 entrepreneurial values can be internalized in students, either by integrating these values into learning materials or the learning process. Because of this, the design of this animated film begins with what contents must appear, starting from entrepreneurial values: responsibility, daring to take risks, creativity, innovation, commitment, hard work, to being realistic. In this research, the design of the animated film is designed as follows.

Fig 2: Kappaphycus Striatum problem

Fig 3: Efforts to foster entrepreneurship in the management of Kappaphycus Striatum

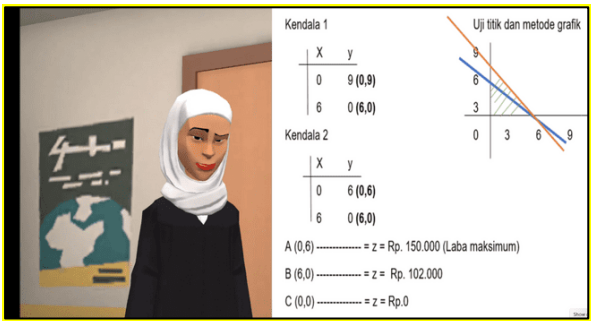


Fig 4: Looking for optimum profit from alternative management of Kappaphycus Striatum

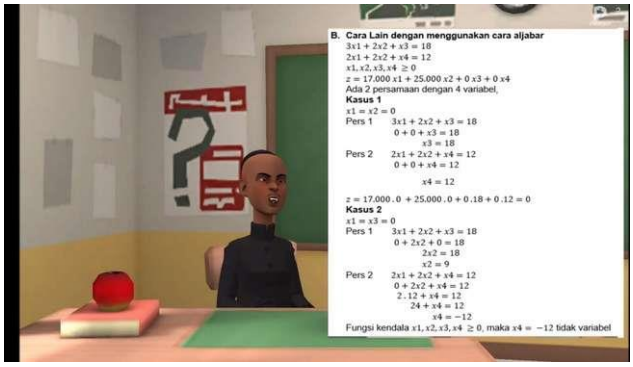


Fig 5: Compile a mathematical model of the Kappaphycus Striatum problem

In the design of the animated film above, various contents of entrepreneurial values are contained, an example of which is described as follows.

1. The courageous attitude to take risks is based on the student's ability to make decisions taking into account the risks they may face. This is represented in the computation completion step, i.e. when deciding which technique to use. In this step, students will go through the process of analysis and determining the technique to be used by identifying the weaknesses of this technique, then choosing one technique with the consequence that there are weaknesses in the chosen technique.

2. Creative and innovative which is reflected in the calculation completion step can foster creative value. This creative value arises because to decide on the technique used, students must consider whether this technique chosen can facilitate the problem-solving process. Sometimes the technique used is a technique that is arranged reflexively. This is by the definition of creativity, namely the ability to organize ideas from different points of view to facilitate problem-solving (Ulwiyah, 2012; Soegoto, 2014). Meanwhile, innovation is realized in the application of the technique to calculate the values of the identified variables. This is by the definition of innovativeness, namely the ability to carry out creativity (Entrepreneurship Education Development Curriculum Center Team).

3. Realism is closely related to mindset in making decisions. Realistic value is achieved if students can think rationally in making decisions. This value is integrated into the four steps of mathematical modeling. This is because the decisions taken in each step of the modeling carried out lead students to think rationally.

a. Development stage

The next plan is the development stage. Researchers will validate instruments, validate animated film products, validate learning models, and also revise them according to suggestions from validators until everything designed is suitable for use with valid categories as in Table 1 below.

Table 1. Description of Learning Material Validity Assessment by Material Experts

Aspect	Validator-1	Validator-2
Content	4	3,8
Language	4	3,33
Presentation	4,2	3,80
Syntax of PBL	4	3,80
Creative thingking skill	4	4
Actual Mean	4,04	3,75
Overall Actual Mean	3,89	

From Table 1 above, it is known that the total average of the two material validators shows a score of 3,89. This score indicates that the validity of animated films in terms of material is the "Good" category. So, it can be concluded that animated films have valid criteria in terms of material.

Table 2. Description of Learning Media Validity Assessment by Media Experts

Aspect	Validator-1	Validator-2
Graphic Quality	4,16	4,16
Display design	4	4
Actual Mean	4,08	4,08
Overall Actual Mean	4,08	

From Table 2 above, it is known that the total average of the two media validators shows a score of 4,08. This score indicates that the validity of animated films in terms of media is the "Good" category. So, it can be concluded also that animated films have valid criteria in terms of media.

b. Implementation stage

The next plan is at the implementation stage, animated film media is applied and field trial data collection is carried out at the College of Teacher Training and Education which is the place for research trials. Before the researcher implemented the animated film product and PBL model, the researcher measured students' creative thinking skills using a written pretest. From the measurement results, the average student score was still less than 50 with an average score achievement for the creative thinking fluency aspect of 37,23; an average score for the flexibility aspect of 30,48; and an average score for the novelty aspect of 21,29. From the details of the achievements above, it can be concluded that students' creative thinking skills are still low and need to be improved in all aspects of creative thinking skills, be it aspects of fluency, flexibility,

or novelty. This is also supported by the results of observations and interviews with students and lecturers which also show the lack of students' ability to generate creative ideas in solving contextual problems related to real problems around them. Data collection for trials and research on a small scale was carried out on 16 students, while trials and research on a large scale were tested on 54 other students at the College of Teacher Training and Education. After the application of the animated film, a student response questionnaire was given with the results as shown in Table 3 below.

Table 3. Description of Students Responses

Aspect	Validator-1
Language	4,32
Interest	4,30
Content	4,36
Ease of Use of Media	4,29
Graphic	4,26
Utility	4,35
Overall Actual Mean	4,31

From Table 3 above, it is known that the total average of the response questionnaire results of 70 students shows a score of 4.31. This score shows that the student response to learning with animated films is in the "Good" category, so it can be concluded that animated films have Practical criteria as development products.

c. Evaluation stage

Before testing the two test results, the researcher tested the normality of the data using the Shapiro-Wilk test. Testing the normality data for the pretest obtained a significant value (p-value) = 0.542. The posttest data got a significance value (p-value) = 0.351. Because the p-value of both tests is > 0.05, the data meets the data distribution's normality requirements. Then, a paired data test was performed using a paired sample t-test with SPSS software.

Based on the paired sample t-test, it is obtained that the significance value (p-value) = 0.003. Because p-value < 0.05, then H0 is rejected. In other words, there is a significant difference between students' creative thinking skills of linear programming concepts before and after using learning media according to the results of the pretest and posttest scores. Besides, the researcher also compared students' mean, the pretest creative thinking skills at 53.95 and the post-test at

79.61. Because the mean posttest score > the mean pretest score, it can be said that there was an increase in students' creative thinking skills after using learning media. Next, the researcher calculated the N-Gain value of the creative thinking skills. From the results of the calculation on the pretest and posttest, students obtained a score of 0.47. This shows that the increase in students' creative thinking skills is in the moderate category that shown on Figure 6.

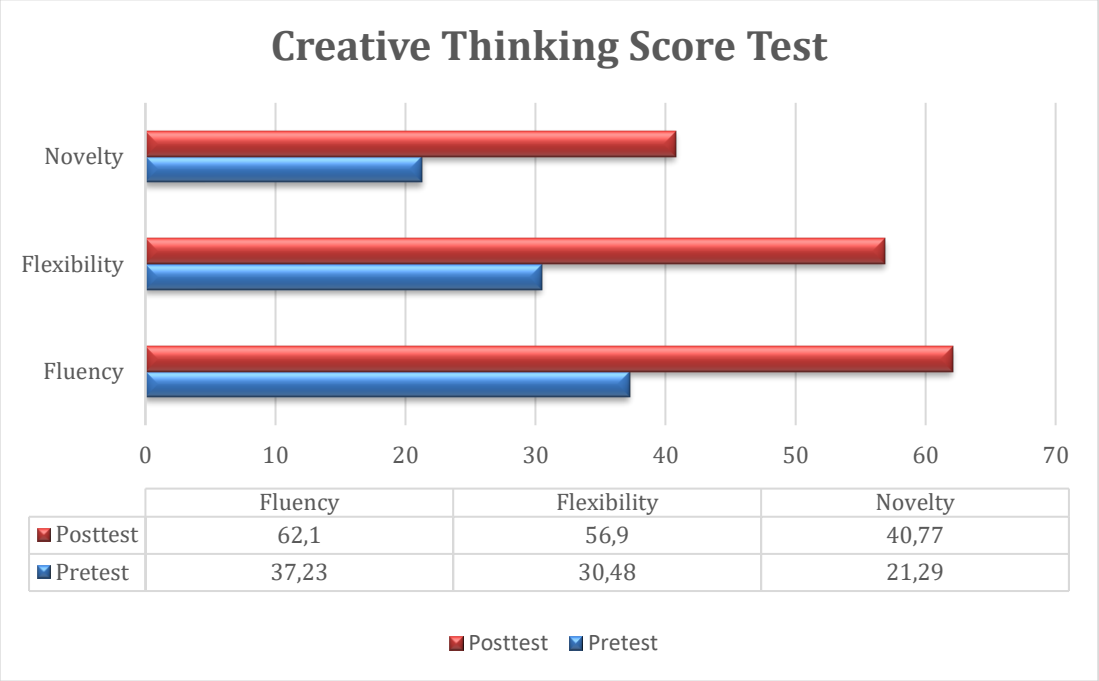


Fig 6: Creative Thinking Score Test

The results of this study indicate an increase in students' creative thinking skills by applying the PBL learning model integrated with animated films. If previously only revealed an increase in creative thinking skills with the PBL model (Mahendrawan et al, 2022) and no one has specifically revealed an increase in creative thinking skills with media that can convey information to the general public, this research facilitates the use of animated films that contains information for the general public. In addition, previous studies have only revealed the effectiveness of animated films (Safitri et al., 2020) and have not revealed their use in learning mathematics which is integrated with the theme of problem solving using local wisdom. The renewal in this research is the use of the PBL model which is focused on the context of real problems of Kappapychus striatum cultivation which have not been optimized for processing in Alor. The PBL model with this animated film is a reference for lecturers to help students improve students' creative thinking skills in solving problems around them.

Conclusion

Animation film media can meet some criteria of validity, practicality, and effectiveness based on product development feasibility testing results. The validity of the animation film is shown by the fulfillment of the excellent category in terms of material, with a mean validation score of 3.89, and the good category, in terms of media, with a mean validation score of 4,08. The practicality of the learning media is shown by the fulfillment of the good category in student responses, with a mean score of 4.31. The effectiveness of learning media is shown by the significant difference between the pretest and post-test scores for creative thinking skills students. Finally, the mean posttest score is greater than the mean pretest score, which can also be seen from the increase between the pretest and posttest scores in the moderate category.

References

Aditiya, M. D. (2022). Students' perspectives in writing narrative texts using the animated film. Ahmad Dahlan Journal of English Studies, 9(1), 27-36.

Andriyani & Suhendri (2019). Model Flipped Classroom Menggunakan Pendekatan Problem Based Learning. Jurnal Pemberdayaan: Publikasi Hasil Pengabdian Kepada Masyarakat, 3(3), 289-292.

Arifani, N.H., Sunardi, S., & Setiawan, S. (2015). Tingkat Berpikir Kreatif Matematika Siswa SMP Kelas VIII di SMP Negeri 6 Jember, SMP Al Furqan 1, SMP Negeri 1 Rambipuji. Kadikma, 6(2).

Arilaksmi, N.P., Susiwo & Sulandra, I.M. (2021). Kemampuan Berpikir Kreatif Mahasiswa Pendidikan Matematika dalam Memecahkan Masalah Open-Ended Trigonometri. Jurnal Ilmiah Pendidikan Matematika, 9(2), 46-58.

Arsantil, A., Zulaeha, I., Subiyantoro & Haryati, N. (2021). Tuntutan Kompetensi 4C Abad 21 dalam Pendidikan di Perguruan Tinggi untuk Menghadapi Era Society 5.0. in Prosiding Seminar Nasional Pascasarjana. 319-324.

Aschauer, W., Haim, K., & Weber, C. (2022). A contribution to scientific creativity: A validation study measuring divergent problem-solving ability. Creativity Research Journal, 34(2), 195-212.

Baig, U., Hussain, B. M., Meidute-Kavaliauskiene, I., & Davidavicius, S. (2022). RETRACTED: Digital Entrepreneurship: Future Research Directions and Opportunities for New Business Model. Sustainability, 14(9), 5004.

Bakari, S., El Weriemmi, M., & Mabrouki, M. (2022). The Impact of digitalization and trade openness on economic growth: new evidence from richest Asian countries. Journal of Research, Innovation and Technologies, 1(2), 7.

Björkdahl, J. (2020). Strategies for Digitalization in Manufacturing Firms. California Management Review,62(4), 17–36.

Chauhan, C., Parida, V., & Dhir, A. (2022). Linking circular economy and digitalisation technologies: A systematic literature review of past achievements and future promises. Technological Forecasting and Social Change, 177, 121508.

Dasilva, B.E., Ardiyati, T.K. & Suparno, S. (2019). Development of android-based interactive physics mobile learning media (IPMLM) with scaffolding learning approach to improve HOTS of high school students in Indonesia. Journal for the Education of Gifted Young Scientists, 7(3), 659-681.

Dhungana, S., & Thapa, R. (2023, December). Ways of Developing Creative Thinking and Reasoning of Students in Mathematics Learning. In Mathematics Education Forum Chitwan (Vol. 8, No. 1, pp. 57-75).

Diawati, P., Ausat, A. M. A., & Augustin, J. (2023). Creativity: how to develop an entrepreneurial attitude of creativity. Journal on Education, 5(4), 11116-11122.

Hadar, L.L. & Tirosh, M. (2019). Creativethinking in Mathematics Curriculum: An Analytic Framework. In Thinking Skill and Creativity pp. 33, 10058.

Hendriana, H. (2017). Hard Skills dan Soft Skill Matematika Siswa. Bandung: Refika Aditama.

Hu, R., Xiaohui, S. & Shieh, C.J. (2017). A Study on the Application of Creative Problem-Solving Teaching to Statistics Teaching. Eurasia Journal of Mathematics, Science and Technology Education, 13(7).

Kartikasari, I. A., Usodo, B. & Riyadi. (2022). The Effectiveness Open-Ended Learning and Creative Problem-Solving Models to Teach Creative Thinking Skills. Pegem Journal of Education and Instruction, 12(4), 29-38.

Kemdikbud. (2017). Panduan Implementasi Kecakapan Abad 21. Jakarta: Direktorat Pembinaan SMA. Dirjen Dikdasmen, Kemdikbud.

Klenner, N. F., Gemser, G., & Karpen, I. O. (2022). Entrepreneurial ways of designing and designerly ways of entrepreneuring: Exploring the relationship between design thinking and effectuation theory. Journal of Product Innovation Management, 39(1), 66-94.

Kraus, K., Kraus, N., Manzhura, O., Ishchenko, I., & Radzikhovska, Y. (2023). Digital transformation of business processes of enterprises on the way to becoming industry 5.0 in the gig economy. WSEAS Transactions on Business and Economics, 93(20), 1008-1029.

Kusumawati, V.G. & Andriyani. (2022). Kemampuan Berpikir Kreatif Siswa Tunarungu dalam

Masalah Operasi Bilangan Bulat ditinjau dari Gaya Kognitif. In PRISMA: Prosiding Seminar Nasional Matematika. 202-213.

Kusumadewi, R. F., & Kusmaryono, I. (2022). Concept maps as dynamic tools to increase students' understanding of knowledge and creative thinking. Premiere Educandum: Jurnal Pendidikan Dasar Dan Pembelajaran, 12(1), 12-25.

Larin, S. & Mayer, V. (2018). The Role of Computer Animation in Mathematics Teaching. Math. Informatics, 6(61), 542-552.

Mardiana, B. U., & Riyadi, A. A. (2023). Kurikulum Berbasis Vokasional Dalam Membentuk Jiwa Entrepreneurship Islami Peserta Didik. In Indonesian Proceedings and Annual Conference of Islamic Education (IPACIE) (Vol. 2, pp. 161-174).

Marhaeni, N.H, Andriyani & Rusmilah. (2021). A Andriyani Efektivitas LKPD Berbasis Problem Based Learning untuk Meningkatkan Kemampuan Pemecahan Masalah Matematis Siswa SMA Negeri 1 Imogiri. Jurnal Pendidikan Surya Edukasi (JPSE), 7(2), 85-96.

Nugroho, A. (2023). Exploring students' creative thinking in the use of representations in solving mathematical problems based on cognitive style. journal of Research and advances in mathematics education, 5, 202-217.

Rizky, R., Hakim, Z., Wibowo, A. H., Pratama, A. G., Sugiarto, A., & Setyowati, S. (2023). Program Peningkatan Kecakapan Hidup Berbasis Vocational Skill Untuk Membangun Jawa Wirausaha Mahasiswa Semester Akhir Mahasiswa Universitas Mathla'ul Anwar Banten. Jurnal Dharmabakti Nagri, 1(3), 133-139.

Safitri, W.Y., Retnawati, H. & Rofiki, I. (2020). Pengembangan Film Animasi Aritmetika Sosial Berbasis Ekonomi Syariah untuk Meningkatkan Minat Belajar Siswa MTs. Jurnal Riset Pendidikan Matematika, 7(2), 195-209.

Sarassanti, Y. & Mutazam. (2019). Analisis Kemampuan Berpikir Kreatif Matematis Mahasiswa Pendidikan Matematika pada Materi Bangun Ruang di STKIP Melawi. Dalam Seminar Nasional Pendidikan MIPA dan Teknologi (SNPMT II).

Subanji, S., & Nusantara, T. (2022). Mathematical Creative Model: Theory Framework and Application in Mathematics Learning Activities. In Active Learning-Research and Practice for STEAM and Social Sciences Education. IntechOpen.

Suripah & Sthephani, A. (2017). Kemampuan Berpikir Kreatif Matematis Mahasiswa dalam Menyelesaikan Akar Pangkat Persamaan Kompleks berdasarkan Tingkat Kemampuan

Akademik. Pythagoras Jurnal Matematika Pendidikan Matematika, 12(2), 149-160.

Suryani, N., Setiawan, A. & Putria, A. (2020). Media Pembelajaran Inovatif dan Pengembangannya. Yogyakarta: Remaja Rosda Karya.

Tang, H., Yao, Q., Boadu, F., & Xie, Y. (2023). Distributed innovation, digital entrepreneurial opportunity, IT-enabled capabilities, and enterprises' digital innovation performance: a moderated mediating model. European Journal of Innovation Management, 26(4), 1106-1128.

Wahida, F & Andriyani. (2022). Effectiveness of Problem Based Learning Model in Improving Mathematical Connection Ability and Active Learning Opportunity Material. Formosa Journal of Sustainable Research (FJSR), 1(2), 97-116.

Xu, J., She, S., & Liu, W. (2022). Role of digitalization in environment, social and governance, and sustainability: Review-based study for implications. Frontiers in psychology, 13, 961057.

Zulkarnaen, Z., Suhirman, S., Hidayat, S., Prayogi, S., Sarnita, F., Widia, W., & Verawati, N. N. S. P. (2022). The Effect of Problem Based Learning Model on Students' Creative Thinking Ability. Jurnal Penelitian Pendidikan IPA, 8(1), 379-382.