Phenomenon, 2023, Vol. 13 (No. 1), pp. 78-95 Phenomenon : Jurnal Pendidikan MIPA

phenomenon@walisongo.ac.id

Fluidmistar Media in Inquiry to Improve the Creative Thinking Skills of Senior High School Students

Susilawati¹, Ayu Wandira², Edi Daenuri Anwar³

^{1,2,3}Universitas Islam Negeri Walisongo Semarang, Jln. Prof. Dr. Hamka Kampus III Kota Semarang, Jawa Tengah

Abstract

Learning media an important role in supporting the learning process as a tool for students to gain mastery of the material. This study aims to produce valid, practical and effective a fluidmistar media and analyze the increase in students' creative thinking skill after using fluidmistar learning media in inquiry. Research and development is a method specifically using the ADDIE development model. The data collection technique used was a test of creative thinking skills and a student response questionnaire. The results of the expert's assessment stated that fluidmistar media was feasible to use improve creative thinking skills through inquiry learning. The implementation of fluidmistar media in inquiry learning was applied to students of SMA Muhammadiyah 2 Gemolong, Central Java with a total sample of 58 students. Media expert validation results obtained recommendations from the data and graphic aspects (90%), color combinations (92%), text selection (88%), content relevance (86%), audio visual presentation (85%) and media effectiveness (87%). Fluidmistar media is declared feasible to be used as a medium for learning fluid concepts. Student responses to the Fluidmistar learning media obtained good category with an mean score is 79.1. The results of students' positive responses indicate that the developed media to improve students' creative thinking skill and positive responses. The increase in creative thinking skill can be seen based on the pretest and posttest score tested through the N-gain test obtained at 0.74 in the high category.

Keywords: fluidmistar media, inquiry, creative thinking skill.

Media Fluidmistar dalam Pembelajaran Inkuiri untuk Meningkatkan Keterampilan Berpikir Kreatif Siswa SMA

Abstrak

Media pembelajaran memberikan peranan penting dalam menunjang proses pembelajaran sebagai alat bantu bagi siswa untuk mencapai penguasaan materi. Penelitian ini bertujuan untuk menghasilkan media fluidmistar yang valid dan menganalisis peningkatan kemampuan berpikir kreatif siswa setelah implementasi menggunakan media pembelajaran fluidmistar. Penelitian dan pengembangan merupakan metode yang khusus menerapkan model pengembangan ADDIE. Teknik pengumpulan data yang digunakan adalah tes keterampilan berpikir kreatif dan angket respon siswa. Hasil penilaian ahli menyatakan bahwa media fluidmistar layak digunakan untuk meningkatkan kemampuan berpikir kreatif melalui pembelajaran inkuiri. Implementasi media fluidmistar dalam pembelajaran inkuiri diterapkan pada siswa salah satu SMA Muhammasiyah 2 Gemolong Jawa Tengah dengan jumlah sampel 58 siswa. Hasil validasi ahli media diperoleh hasil rekomendasi dari aspek data dan grafik (90%), kombinasi warna (92%), pemilihan teks (88%), relevasi konten (86%), presentasi audio visual (85%) and efektivitas media pembelajaran (87%). Media Fluidmistar dinyatakan layak digunakan sebagai media pembelajaran konsep fluida. Respon siswa terhadap media pembelajaran Fluidmistar diperoleh kategori baik. Hasil respon positif siswa menunjukkan bahwa media yang dikembangkan dapat meningkatkan keterampilan berpikir kreatif siswa dan respon positif. Peningkatan keterampilan berpikir kreatif dapat dilihat berdasarkan skor pretest dan posttest yang diuji melalui uji N-gain diperoleh sebesar 0,74 dengan kategori tinggi. Media pembelajaran fluidmistar cocok digunakan dalam pembelajaran inkuiri untuk meningkatkan kemampuan berpikir kreatif siswa pada materi fluida dinamis.

Kata Kunci: Media Fluidmistar, inquiry, keterampilan berpikir kreatif.

INTRODUCTION

Learning media acts as an intermediary for teacher-student communication to achieve learning goals. The use of learning media provides experiences that cannot be obtained directly by students, learning activities do not become monotonous and boring. Teachers need learning aids to facilitate delivery and explanation of material during the learning process. Technology development can be utilized to maximize the learning process (Mikeska & Lottero-Perdue, 2022). Teachers are expected to create and apply innovative and creative media. Instructional media are very varied which can be used as learning aids, but the use of learning media is not optimal. Selection of the right learning media can be considered from various aspects of the priority which is directed at making students active, creative and motivate students to be enthusiastic about learning (Chang et al., 2022).

Learning media is a learning tool that aims to facilitate the delivery of information and data during learning activities. The use of learning media is able to inspire and motivate students to learn. The selection of learning media greatly influences the understanding of the material and whether or not learning objectives are achieved (Mikeska & Howell, 2020). This requires the selection of appropriate media. Interactive learning media is used as a choice of learning resources that can add and broaden insights and train students' independence so that they are able to think creatively and innovatively during the learning process (Ault et al., 2015). This is an attempt to achieve learning objectives through directing to obtain learning resources. The existence of learning media facilitates learning activities, understands the material and gives the impression of long learning in students' memories.

Student-centered learning methods are able to encourage students' knowledge and skills. Students are not enough to remember facts and obtain information, but must be able to solve problems, analyze information, and think creatively (Mastery et al., 2022). The results of an interview with a physics teacher at a senior high school in Sragen district stated that the limitations of appropriate learning media to be used as a tool for understanding material are still low. In addition, the results of the students' initial responses stated that learning resources and learning media that are easily accessible and make it easier for students to learn are still very much needed so that students can study independently at school and at home. The results of students' initial responses regarding creative thinking skills obtained a description that students' creative skills were still low. The results of the initial response regarding students' responses to understanding the concept of dynamic fluid obtained the response that dynamic fluid material is very interesting and can be found in everyday life. However, dynamic fluid learning requires interesting learning media so that it is more durable in students' memories and provides direct experience. Some students stated that dynamic physics material was difficult to get a more structured and applicable understanding.

The limitations of learning media and the minimal use of learning media are of particular concern in creativity and problem solving (Cahyono, et al., 2023). The results of the study state that instructional media that are designed flexibly and creatively influence the optimization of the learning process in achieving learning objectives. Teachers can deliver material interactively, holistically and update (Haleem, et al., 2022). Interactive, holistic and up-to-date delivery of material can be assisted with student activity sheets and textbooks. Relevant research results state that the use of interactive multimedia can increase students' creative thinking abilities. Android application-based learning media is an example of interactive multimedia (Real et al., 2022). Based interactively, holistically and update.

Creative thinking skills are very important to be provided to students in learning because these skills can lead students to a mindset with creativity so they can create innovative work (Mastery et al., 2022). Creative thinking is needed in solving problems in conflicts that exist in the workplace (Cahyono, Rohman & Fauzi, 2021). These skills can be enhanced with the facilities of student learning activities and experiences. Analytical skills as part of creative thinking skills that seek to master a skill and ability to make the right decisions (Aninnas, Supeno & Wicaksono, 2022). Analytical skills are shown in a careful, thorough and detailed manner in mastering a problem at hand (Fahmi,, Widayati & Priwantoro, 2022). In reading narratives, analyzing data, designing plans should be analyzed first (Paramata et al., 2022). Open thinking skills as a part of other creative thinking skills that try to have an open mindset. In this case, courage is needed to avoid random assumptions, courage fuels the skill of exploring new things.

Problem solving skills, organizational skills and communication skills that are influenced by creative thinking skills. Creative ideas are needed to be able to solve good problems. Organizational skills are owned by individuals who have high creativity (Ndoa & Anastasia, 2022). Within the organization, individuals are encouraged try to think ahead and challenged to come up with innovative ideas that are expected to be utilized by society (Haris Odja et al., 2022). Communication skills as skills that can improve creative thinking skills. Creative ideas can be conveyed well if you are able to convey these creative ideas with good communication skills (Susilawati et al., 2021). Creative thinking skills can be implemented in the form of activities such as compiling computer programs to optimize the learning process, designing social media platforms, identifying innovative learning methods, finding experimental design and inventions in the application of technology.

The concept of fluid dynamics as contextual material in physics learning and real material is easy to find in life. However, there are several misconceptions about dynamic fluid material, including misconceptions that seem very dominant (Atmam & Mufit, 2023). For example, water will stop flowing if the water level is level with the hole through which the hose goes out of the vessel. Students tend to equate this case with the case of an ordinary perforated vessel (Rahmawati et al., 2022). A small number of students have been able to give the correct answer, while others still have the notion that water will only stop flowing if the water level does not reach the inner end of the hose. Some students also thought that the water would stop flowing if the water level was lower

Universitas Islam Negeri Walisongo Email: <u>susilawati@walisongo.ac.id</u> than the highest point of the hose (Damayanti & Mundilarto, 2022). This misconception arises because students only use the concept of potential energy without involving the concepts of pressure and kinetic energy as expressed in Bernoulli's equation. Students with this misconception tend to this case is analogous to a case like a rolercoster (Fahmi et al., 2022). The results of previous studies stated that most students were able to understand dynamic fluid material limited to equations without understanding the concepts and fission meaning of dynamic fluid equations. Based on the study of the research results above, an effort is needed to develop interactive learning media for dynamic fluid material that is able to stimulate students' thinking skills so that misconceptions do not occur.

The design of interactive learning media is expected to motivate students to learn so that they can improve students' creative thinking skill (Susilawati; et al., 2022). The research conducted is different from previous research because in the development of Fluidmistar media it applies an android application so that Fluidmistar media can be used as a medium for independent learning and can be used at any time. The interactive multimedia design developed is the form of an android application, such as the Fluidmistar media. The application is made using Microsoft Powerpoint which has been integrated with the iSpring Suite to convert HTML5 site from iSpring Suite to android application using apk web. The development of Fluidmistar media contains dynamic fluid material, practice questions, interactive games and evaluations which are packaged in interactive quizzes. The development of the Fluidmistar application is directed at improving creative thinking skills. Based on the description above, this study aims to develop Fluidmistar media in inquiry learning to improve students' creative thinking skills.

RESEARCH METHODS

The research method uses research and development (R&D) methods to produce a product through testing the feasibility and effectiveness of the product (Dick & Carey, 1990). The research phase refer to ADDIE development model. ADDIE model consist of analyze, design, development, implement & evaluation (Aldoobie, 2015). In the initial phase of the research, a needs analysis was carried out to capture the potential and benefits

for the wider community. The second phase is designing Fluidmistar media in the form of storyboards and designing tools for implementing Fluidmistar media in the form of lesson plan and research instruments. The third phase, developing Fluidmistar media based on storyboard designs, developing product feasibility test sheets, developing guidelines for using media and student activity sheets, developing creative thinking skills test instruments and developing student response questionnaires to Fluidmistar media.

Expert validation is carried out to obtain product improvement suggestions that are developed based on aspects of media performance and material content explained through Fluidmistar media tool. This research data collection technique used a test of creative thinking skills and students' responses to interest using Fluidmistar media. The creative thinking skills test consists of four creative thinking indicators, such as thinking fluency skills, thinking flexibly skills, thinking originally and detailed thinking. The creative thinking skills test was compiled and developed in the form of an essay totaling 13 items on creative thinking skills. Student responses to interest using Fluidmistar media were measured using a student response statement questionnaire. Student response questionnaires were developed in the form of a Likert scale with four choices, such as excellend, moderate, poor and very poor.

The fourth phase, the implementation of Fluidmistar media in inquiry learning. Implementation of learning begins a pretest to photograph creative thinking skills before using Fluidmistar media . Creative thinking skill indicators such as Table 1.

Creative	Thinking	Description of skill		
Skill				
Flexible thin	nking skill	The ability to see different points of view and		
		consider different alternatives or solutions		
Original thinking skill		The ability to generate new, unique and original ideas		
Detailed thi	nking skill	The ability to develop and dig deeper into existing		
-		ideas by providing more detail and complexity		
Fluent think	ting skill	The ability to generate a large number of ideas in a		
_		limited amount of time.		
Sensitivity to problems		The ability to identify and recognize problems or		
		challenges that exist in certain situations or contexts.		
Association	skills	The ability to make connections or link together		
		different ideas creatively.		
Originality	in	The ability to express ideas in a unique and		
expression		unconventional way.		

Table 1. Indicators of Creative Thinking Skill

Universitas Islam Negeri Walisongo Email: <u>susilawati@walisongo.ac.id</u> ©2016 Universitas Islam Negeri Walisongo ISSN: 2088-7868, e-ISSN 2502–5708

(Khatib & Kim, 2018; Smith & Johnson, 2019) In this study, only four indicators were examined from indicators of creative thinking skill on Table 1, among others detailed thinking skill, fluent thinking skill, original thinking skill and flexible thinking skill.

The implementation of inquiry learning using Fluidmistar media was carried out in 3 meetings which examined fluid content and solved quizzes as assignments. The third meeting, questionnaires were distributed to students' responses to the use of Fluidmistar media. The implementation of inquiry learning ends with a posttest to evaluate creative thinking skills after applying Fluidmistar media in inquiry learning. The fifth phase, evaluation as the final phase to evaluate the results of the development and implementation of the use of Fluidmistar media in inquiry learning. The data analysis technique used is quantitative descriptive analysis to analyze the quantity, percentage, results of expert validation and results of the student response questionnaire analysis.

Inquiry learning steps carried out by students: (1) observation, students observe and collect information about the topic or phenomenon being studied; (2) formulating questions, students formulate relevant and interesting questions based on their observations; (3) planning and design, students plan and design experiments or research activities to answer their questions; (4) data collection, students carry out experiments or research activities according to their plans; (5) data analysis, students analyze the data that has been collected using appropriate analytical tools; (6) conclusion drawing, students draw conclusions based on the results of their data analysis; (7) communication, students share their findings with teachers and classmates through written reports, presentations, or discussions.

In addition, an analysis of the increase in creative thinking skills was carried out using the normalized gain equation (Hake, 1999). Effect size analysis of the implementation of Fluidmistar media on creative thinking skills is carried out using effect size calculations. The category of increasing creative thinking skills and the effect size of Fluidmistar media on creative thinking skills consists of low, medium and high categories. Quantitative analysis method involves using statistical and numerical analysis techniques to process the collected data. The creative thinking skill assessment rubric is a guide that contains clear criteria for assessing students' creative skills. The rubric covers aspects such as quality and originality of ideas, idea development, creativity in problem solving, and creative presentations.

The population of this study were students of Grade XI SMA Muhammadiyah2 Gemolong. The research sample consisted of 58 students of Grade XI of a senior high school with a modest sample selection. Prior to the implementation of Fluidmistar media in inquiry learning, the research sample was given a student readiness questionnaire to prepare for using Fluidmistar media and the capacity of each student's smartphone device. Giving a questionnaire to capture the overall preparation of students to apply inquiry learning with Fluidmistar media. The results of student preparation responses to study an active role in inquiry learning using Fluidmistar media are shown in Table 2.

Participant's Initial Skill	Level (quality)	Frequency (participant)	Percentage (%)
Internet access	moderate	55	95
Create electronic messages	moderate	49	89
Using information on the website	low	46	80
Smartphone device installation	moderate	46	84
Active in online learning	low	48	87
Take online quizzes	moderate	51	93

Table 2. Student Preparation Responses Using Fluidmistar Media

Table 2. The distribution of students' preparation for using Fluidmistar media in inquiry learning shows frequency of students who have smartphone devices that support Fluidmistar media. The frequency of students is described based on the ability to operate smartphones, websites and e-mail. The distribution of questionnaire shows that 88% of students are able to access learning resources on the internet, create electronic messages, and use information on websites. Based on initial data, it was obtained the perception that students were able to installations, online learning and online quizzes. Therefore, inquiry learning using Fluidmistar media can be continued for further research data collection.

RESULTS AND DISCUSSION

The creation of Fluidmistar media begins design of visual media display as the basic concept for developing Fluidmistar media. Product design is made to link between

material content, fluid visualization and quizzes. The Fluidmistar media design is designed to follow the order in which the media is displayed as shown in Figure 1.

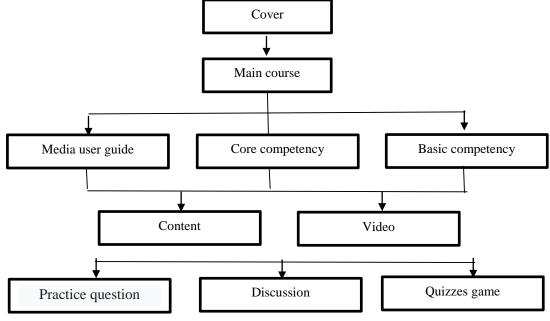


Figure 1. Fluidmistar media design

Figure 1 shows the initial to final design of the media covering main course, competency analysis, content, video, practice question, discussion, dan quizzes game. The developed product specifications are intended to improve creative thinking skills in dynamic fluid material. Fluidmistar media was developed using the iSpring Suite which is based on Android application. The display of the Fluidmistar application can be seen in Figure 2.



Figure 2. Fluidmistar media view

Figure 2 shows an overview of the media covers as home page, quis, and exercise. The main menu contained in the learning media includes instructions for using

Fluidmistar media, core competencies, basic competencies, learning objectives, dynamic fluid material, applied fluid videos, practice questions in quizzes and discussion of quizzes. Quizzes in learning media is in the form of a spin game which is useful for determining the number of questions that must be done by students. The pointer stops, the student is required to work on the problem.

Fluidmistar's media feasibility was analyzed based on the results of expert validation which assessed six aspects of assessment aspects, that is data and graphic, colour combinations, text selection, content relevance, audio visual presentation and media effectiveness. The results of the material expert validation can be seen in Figure 3.

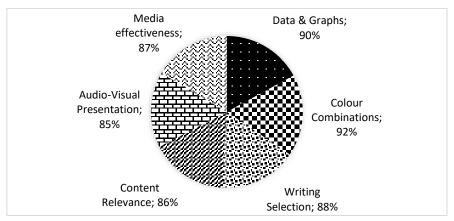


Figure 3. Expert Validation of Fluidmistar Media

Figure 3 shows the results of expert validation including aspect of content, writing, colour combination, data and graphs, media effectiveness and audio-visual presentation. The results of validation media calculations, the average percentage of the media validation aspect, which is 88%, is included in the 'Very feasible' category. The feasibility of Fluidmistar media states that media can be used as a medium for learning dynamic fluid material with several revision. The revision of the Fluidmistar media proposed by the validator included adding images and illustrations of the application of dynamic fluid in everyday life. In addition, the addition of content to the quizzes is given to attract students' interest in learning while playing games.

Material expert validation assesses six aspects of the assessment, that is no misconceptions, content adequacy, content quality, contextual assessment, systematic presentation of the material and truth of material substance. The results of the material expert validation can be seen in Figure 4.

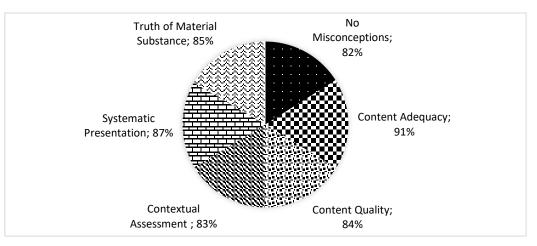


Figure 4. Expert validation of dynamic fluid material

Figure 4 states the expert validation of dynamic fluid material, the calculation results of the six aspects of dynamic fluid material validation have an average percentage of material feasibility, namely 85% with a very feasible category. The feasibility of the material states that the material presented on Fluidmistar media can make it easier for students to discuss dynamic fluids. Dynamic fluid material is still needed to fulfill the adequacy of material starting from the continuity equation and water discharge to the application of Bernoulli's principle.

The procedure for implementing Fluidmistar media in dynamic fluid learning is carried out through 3 parts of activity. The first, media introduction activities start with installing the Fluidmistar media and introducing menu options that present material content and exercises on dynamic fluid problems. The second, the implementation of Fluidmistar learning through inquiry learning assisted by Fluidmistar media starts with a pretest. After the pretest, students are given learning experiences through inquiry learning assisted by Fluidmistar media which ends with a posttest and distribution of student response questionnaires to the use of Fluidmistar media. The third, evaluation of the achievements and improvement of creative thinking skills and the results of students' interest responses to Fluidmistar media in inquiry learning. When implementing Fluidmistar media in inquiry learning, it can run smoothly. The implementation was carried out in three meetings where assistance was provided and explanations were given to the use of Fluidmistar media to study dynamic fluids and improve students' creative thinking skills. Discussions were held between the mode teacher and students to observe the progress of students' skills in using Fluidmistar media. Achievements and improvement of students' creative thinking skills are shown in Table 3.

Indicator of	Sco	ore	N-	Category	Ave	erage	N-Gain	Category
creative thinking skill	Pretest	Post test	Gain Score		Pretest	Posttest	Average	
Detailed thinking skill	36.7	83.1	0.73	High	31.5	82.4	0.74	High
Fluent thinking skill	26.9	81.7	0.75	High				
Original thinking skill	29.6	84.3	0.77	High	-			
Flexible thinking skill	32.8	80.8	0.71	High	-			

Table 3. Achievement of Students' Creative Thinking Skill

Table 3 states each indicator of creative thinking skill to think creatively in dynamic fluid material obtains an average increase in the high category of 0.74. Students can generate various problem solving ideas. Several students are able to provide new ideas, innovations and scientific arguments. Inquiry learning using Flumistar media is stated to have an influence on creative thinking skills. The effect size of creative thinking skills is shown in Table 4.

Calculation of	Statistic test		Effect	
effect size	_	Small	Medium	Large
Cohen's d	Paired t test	0.1	0.3	0.9
Eta Squared	ANOVA	0.02	0.05	0.13
r	Correlation	0.1	0.4	0.4
r^2	Correlation	0.01	0.08	0.3

 Table 4. Effect Size of Creative Thinking Skills

Table 4 states the effect size on large effect criteria is 0.9 if the significance criteria are p<0.05 two-tailed and power, then Fluidmistar media has a high influence on creative thinking skills. The implementation of inquiry learning using Fluidmistar media gives interest to students in the dynamic fluid learning process. Student response questionnaire to Fluidmistar media is shown in Table 5.

Table 5. Student Response Questionnaire to Fluidmistar Media

Aspect	Response statement	Student response choices (%)		
		Low	Moderate	High
Student	Media Fluidmistar helps to	4.0	23.0	73.0
attitudes	understand dynamic fluid material			
towards	easily			
Fluidmistar	Fluidmistar media can increase	1.0	20.0	79.0
media	learning motivation			
	Media Fluidmistar arouses curiosity	1.0	12.0	77.0
Learning	Fluidmistar media makes students	3.0	10.0	87.0
experience	learn actively & participatively			
	Fluidmistar media reduces the	2.0	13.0	85.0
	difficulty of learning fluid dynamic			
	material			
	Fluidmistar media provides	2.0	20.0	78.0
	interactive group discussion			
	opportunities			
Media	Fluidmistar media can be used with a	3.0	21.0	76.0
convenience	simple procedure			
	Pictures and videos link memory to	5.0	16.0	79.0
	dynamic fluid material			
	Presentation of material in	2.0	23.0	75.0
	Fluidmistar media is systematic and			
	effective			
	Fluidmistar media helps students	6.0	12.0	82.0
	learn independently			
Mean		2.9	17.0	79.1

Table 5 presents the results of an analysis of student responses to the use of fluid ruler media which reveals aspects of student attitudes towards fluid ruler media, learning experience and media convenience. Flumistar media makes it easy for students to understand dynamic fluid material and can be used as learning media independently. The stimulation of creative thinking students can provide various answers to the questions given. Students' creative thinking skills are important to solve problems with new ideas. Good lesson planning can improve creative thinking skills, the use of Flumistar media with material preparation steps is carried out to trigger students' ways of thinking. Interactive learning media can be used as a choice of learning resources that are able to add and broaden insights and train students' independence so that able to think creatively and innovatively during learning activities. Interactive learning media makes it more active during learning activities, students don't feel bored quickly and the material can be

easily understood (Korukluoğlu & Yucel-Toy, 2022). Fluidmistar media is effectively used as a learning media that can measure and improve students' creative thinking skills.

The urgency of creative thinking skills is needed in various fields, especially in science. What needs to be done to improve creative thinking skills is to increase students' understanding, fluency, flexibility and innovation in solving a problem (Park et al., 2022). Teachers can train students' creative thinking skills through the atmosphere of the learning process in group by implemented learning that provides opportunities for each student to express any ideas that are owned freely but still under student guidance as learning facilitators. Giving exercises in the form of questions in the form of problem solving affects the development of students' creative thinking skills (Kapici et al., 2022). Giving open-ended questions which are carried out intensively by the teacher allows students to think complexly and systematically, will stimulate students to bring up a variety of answers so that an impact on the development of students' creative thinking skills (Chang et al., 2022).

Creativity means being able to create something new to consider something student learning outcomes from data sets and group projects in new ways. Students are expected to be able to think creatively and bring new perspectives for the provision of skills when student graduate to create and work (Matsun, Boisandi, Sari, & Hadiati, 2021). Creative thinking denotes the skill of seeing things in a new way involving lateral thinking or the ability to perceive patterns that are not clear. Creative students have the ability to devise new ways of doing tasks, problem solving and meeting challenges. Students bring an open perspective with a way of thinking that can help move towards a more productive work.

Some people are naturally more creative than others, but the ability to think creatively can be strengthened with practice. Students can develop creative thinking skills by problems solving through tools in the form of learning media (Budiarti et al., 2021). Creative thinking skills can be grown and improved through the process of training, learning and media that make it easier for students to gain learning experience to work. Creative thinking skills which are enhanced through the help of learning media require a more open, fun, logical and risk-taking approach. The ability to evaluate an identified idea as a potential with good value (Muliyati et al., 2022). Creativity can be done through learning from what doesn't work until it achieves success.

Creative thinking skills are more about attitude, confidence, lots of predictions, and generating lots of suggestions that require an analytical and logical approach that can be categorized as a possible risk (Mufit & Fitri, 2022). Focusing on the subject logically, analytically for some time, thinking about possible solutions and distracting thoughts. Innovation, creative thinking and problem solving are becoming increasingly important skills to be able to see things from a new perspective, solve old problems with simple changes and really drive progress. Being able to think creatively, solve problems and create new and innovative ideas will make students stand out in a crowd and put students in a strong position, able to think strategically or generate innovative ideas.

CONCLUSION

The results of research and development of Fluidmistar media which were developed based on the aspects of material feasibility and media feasibility. The results of analysis the eligibility description of the material are 85% and the eligibility of the media is 88% so that the Fluidmistar media is classified as a valid, practical and effective media. Fluidmistar media helping students to make inquiries that develop readiness and mastery of skills in cognitive processes. The results of expert recommendations on Fluidmistar media obtained learning media products for decent fluid material. Students' creative thinking skills using Fluidmistar media in inquiry activities obtained a high increase in creative thinking skills of 0.74. The significant influence that Fluidmistar media has on creative thinking skills is included in high category. Fluidmistar media has a significant influence on the creative thinking skills of Grade XI students in fluid material. Positive response to Fluidmistar media in inquiry learning from Grade XI high school students. The results of students' creative thinking skills increased at the high category level because the learning media used Fluidmaster media, provided opportunities for students to learn fluid content more easily, practically, independently, flexibly and interactively. The components provided in Fluidmistar media consist of material content, practice questions and games in the form of online quizzes. Fluidmistar learning media is suitable for use in inquiry learning to improve students' creative thinking skills on dynamic fluid material.

REFERENCE

- Aldoobie, N. (2015). ADDIE Model. American International Journal of Contemporary Research, 5(6). https://www.aijcrnet.com/journals/Vol_5_No_6_December_2015/10.pdf
- Aninnas, A., Supeno, & Wicaksono, I. (2022). The Using Natural Phenomenon Video In The Science Learning on Junior High School Student's Scientific Creativity. *Phenomenon: Jurnal Pendidikan MIPA* 12(2): 216-225
 DOI: 10.21580/phen.2022.12.2.11942
- Atmam, P. L., & Mufit, F. (2023). Using Adobe Animated CC in Designing Interactive Multimedia Based on Cognitive Conflict on Parabolic Motion Materials. *Jurnal Ilmu Pendidikan Fisika*, 8(1), 64–74. <u>http://dx.doi.org/10.26737/jipf.v8i1.3597</u>
- Ault, M., Craig-Hare, J., Frey, B., Ellis, J., & Bulgren, J. (2015). The Effectiveness of Reason Racer, a Game Designed to Engage Middle School Students in Scientific Argumentation. *Journal of Research on Technology in Education*, 47, 21–40. https://doi.org/10.1080/15391523.2015.967542
- Budiarti, I. S., Boy, B. Y., & Lumbu, A. (2021). Students 'Scientific Problem Solving Skills in 3T Region: Using PhET Simulation to Enhance the Matter. Jurnal Pendidikan Fisika Dan Keilmuan (JPFK), 7(2), 59–76. http://ejournal.unipma.ac.id/index.php/JPFK/article/view/10783/0
- Cahyono, B. Rohman, A.A., Styawati, R.D. & Dzakiyyah, R.I. (2023). Pengembangan Media Pembelajaran E-Komik Berbasis Etnomatematik dan Kemampuan Berikir Kreatif pada materi Geometri MTs. Aksioma, 12(2): 2283-2294 <u>http://dx.doi.org/10.24127/ajpm.v12i2.7398</u>
- Cahyono, B., Rohman, A.A. & Fauzi, M. (2021). Profle of Students' Creative Thinking in Solving Mathematics Problems in Terms of Gender. *Journal of Physics Conference Series*, 1796, DOI 10.1088/1742-6596/1796/1/012117
- Chang, P.-S., Lee, S.-H., & Wen, M. L. (2022). Developing an inquiry-based laboratory curriculum to engage students in planning investigations and argumentation. *International Journal of Science Education*, 44(18), 2659–2684. https://doi.org/10.1080/09500693.2022.2141083
- Damayanti, N., & Mundilarto, M. (2022). The iSpring learning media integrated with the KWL learning model: Impact on Students' self-directed learning in momentum and impulse. Jurnal Ilmiah Pendidikan Fisika Al-Biruni, 11(1), 77–89. https://doi.org/10.24042/jipfalbiruni.v11i1.11363
- Dick, W., & Carey, L. (1990). *The Systematic Design of Instruction. (Third ed.).* United Stated of America: Harper Collins Publishers.
- Fahmi, S., Widayati, & Priwantoro, S. W. (2022). Android Learning Media Development to Improve Spatial Ability. *Jurnal phenomenon*. 12(1), 90–107.
 DOI: <u>10.21580/phen.2022.12.1.10411</u>
- Hake, R. R. (1999). Analyzing Change/Gain Scores. dalam www.physics.indiana.edu/sdi/AnalyzingChange-Gain.pdf diakses 10 November 2017

Universitas Islam Negeri Walisongo Email: <u>susilawati@walisongo.ac.id</u>

- Haleem, A., Javaid, M., Qadri, M.A. & Suman, R. (2022). Understanding the Role of Digital Technologies in Education: A Review. Sustainable Operations and Computers, 3(2): 275-285 DOI:10.1016/j.susoc.2022.05.004
- Haris Odja, A., Hasan, M., & Mursalin. (2022). The Effect of Problem Based Learning Applied With Blended Learning on Students' Problem Solving Skills. Jurnal Ilmu Pendidan Fisika, 7(3), 248–255. https://journal.stkipsingkawang.ac.id/index.php/JIPF/article/view/3249
- Kapici, H. O., Akcay, H., & Cakir, H. (2022). Investigating the effects of different levels of guidance in inquiry-based hands-on and virtual science laboratories. *International Journal of Science Education*, 44(2), 324–345. https://doi.org/10.1080/09500693.2022.2028926
- Khatib, M., & Kim, B. (2018). Fostering Creative Thinking in Science Education: An Investigation of Inquiry-Based Learning Using Fluidmixtar Media. *Journal of Science Education*, 42(3), 287-302. <u>http://dx.doi.org/10.23960/jpmipa/v23i3.pp792-803</u>
- Korukluoğlu, P., & Yucel-Toy, B. (2022). Digital storytelling in online elementary science education: a case study on science and technology club activities. *International Journal of Science Education*, 44(17), 2541–2564. https://doi.org/10.1080/09500693.2022.2138727
- Matsun, Boisandi, Sari, I. N., Hadiati, S., & Pramuda, A. (2021). Development of Potential Energy Props Based on Arduino Uno Microcontroller to Improve Student Achievement. *Jurnal Pendidikan Fisika dan Keilmuan*, 7(2), 108–129. http://ejournal.unipma.ac.id/index.php/JPFK/article/view/9952
- Mikeska, J., & Howell, H. (2020). Simulations as practice-based spaces to support elementary teachers in learning how to facilitate argumentation-focused science discussions. *Journal of Research in Science Teaching*, 57. https://doi.org/10.1002/tea.21659
- Mikeska, J., & Lottero-Perdue, P. (2022). How preservice and in-service elementary teachers engage student avatars in scientific argumentation within a simulated classroom environment. *Science Education*, *106*. https://doi.org/10.1002/sce.21726
- Mufit, F., Asrizal, A., Puspitasari, R., & Annisa, A. N. (2022). Cognitive Conflict-based E-Book with real experiment video analysis integration to enhance conceptual Understanding of Motion Kinematics. *Jurnal Pendidikan IPA Indonesia*, 11(4), 626– 639. https://doi.org/10.15294/jpii.v11i4.39333
- Mufit, F., & Fitri, A. D. (2022). The Analysis of Experiment Video on Cognitive Conflict-Based Teaching Materials to Enhance Momentum-Impulse Concepts Understanding. Jurnal Penelitian dan Pengembangan Pendidikan Fisika, 8(2), 293–304. <u>https://doi.org/10.21009/1.08211</u>
- Muliyati, D., Putri, R. M., & Fahdiran, R. (2022). "Elektrotektif": An Educational Game to Explore Electricity Concept Using Case-Based Learning. Jurnal Penelitian dan Pengembangan Pendidikan Fisika, 8(2), 283–292. <u>https://doi.org/10.21009/1.08210</u>

- Ndoa, Y. A. A., Anastasia, D. P. & Jumadi. (2022). Development of An Android-Based Physics E-Book with A Scientific Approach to Improve The Learning Outcomes of Class X High School Students on Impulse and Momentum Materials. Jurnal Pendidikan Fisika Indonesia, 18(2), 107–121. https://doi.org/10.15294/jpfi.v18i2.30824
- Paramata, R., Odja, Y., & Setiawan, B. (2022). Development of Learning Media using Powtoon Application on Liquid Pressure Topic. Jurnal Pendidikan Fisika Indonesia, 18(2), 182–191. https://doi.org/10.15294/jpfi.v18i2.36839
- Park, J., Chang, J., Park, J., & Yoon, H.-G. (2022). Features of and representational strategies in instructional videos for primary science classes. *International Journal* of Science Education, 44(16), 2397–2422. https://doi.org/10.1080/09500693.2022.2126289
- Rahmawati, I., Nisrina, N., & Abdani, M. R. (2022). Multi-representation-based interactive physics electronic module as teaching materials in online learning. *Jurnal Ilmiah Pendidikan Fisika Al-Biruni*, *11*(1), 47–55. https://doi.org/10.24042/jipfalbiruni.v11i1.10544
- Smith, J., & Johnson, A. (2019). Enhancing Creative Thinking Skills of High School Students through Inquiry-Based Learning with Fluidmistar Media. International Journal of STEM Education, 6(1), 18-21 https://journal.unesa.ac.id/index.php/jpps/article/download/3855/2186
- Stiawan, E., Basuki, R. Liliasari & Rohman, I. (2022). Enhancement of Indonesian high school student conceptual mastery on VSEPR topic using virtual simulation of molecule shapes: A Case Study of quasi-experimental evidence. *Jurnal Pendidikan IPA Indonesia*, 11(4), 511–518. https://doi.org/10.15294/jpii.v11i4.36385
- Susilawati, Azizah, N. A. N., & Kusuma, H. H. (2021). Investigating differences in project activities and student digital literacy between learning through electronic workbench and PhET Simulation. Jurnal Ilmiah Pendidikan Fisika Al-Biruni, 10(2), 299–311. https://doi.org/10.24042/jipfalbiruni.v10i2.10008
- Susilawati, Rusdiana, D., Kaniawati, I., & Ramalis, T. R. (2022). Pre-Service Physics Teacher Conceptions and Visual Literacy to Observe Sky Maps throught Heaven View Media. Jurnal Ilmu Pendidikan Fisika, 7(1), 18–29. https://journal.stkipsingkawang.ac.id/index.php/JIPF/article/view/2179