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Physics Learning Innovation: Revealing the Potential of Lectora Inspire-Based Media with a Scientific Approach

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Abstract. The purpose of this research is to (1) Summarize the procedure for developing Lectora Insprire-based learning media with a scientific approach for learning high school physics on Dynamic Fluid material that meets good criteria, (2) Summarize the specifications of Lectora Insprire-based learning media with a scientific approach for learning high school physics on Dynamic Fluid material that has been developed, (3) Summarize the results of expert assessment of Lectora Insprire-based learning media with a scientific approach for learning high school physics on Dynamic Fluid material in terms of material, design, and language aspects. The research method used is Research and Development, which uses the ADDIE development model. The stages passed in this study are limited to the analysis stage, design stage, and development stage. Research data sources from supervisors, peers, high school physics teachers, and students of SMA Negeri 2 Magelang and SMA Negeri 4 Magelang. The data collection technique used in this research is distributing needs and assessment questionnaires. The analysis techniques used are qualitative analysis and quantitative analysis. The specifications of the developed media are published in .exe format, and there are features in the form of menus to go to specific pages. They are equipped with simulations and interactive questions and can be run offline. The results of the media assessment developed meet the criteria of excellent assessment given by the supervisor, peers, high school physics teachers, and high school students in class XI. This research can be the basis for developing Lectora Inspire-based learning media with a scientific approach to Dynamic Fluid material.

Keywords: Dynamic fluid; learning media; Lectora Inspire; scientific approach

INTRODUCTION

Physics is a group of exact sciences in the world of education. Physics is one family of science with mathematics and old science (Lusiani et al., 2021). According to Young & Freedman (2002), phenomena that occur in nature around humans can be found in patterns and principles that connect each existing natural phenomenon. These patterns and principles are called physical theories, or if this theory can be proven and widely used, it is called the laws or principles of physics.

At the high school level, the physics studied is Basic Physics. The science that studies physics fundamentally and thoroughly from the laws, concepts, principles, and theories of physics is called Basic Physics (Lusiani et al., 2021). One of the materials taught at the high school level is Dynamic Fluid.

Physics learning at the high school level, especially in a dynamic fluid material, is still found to have difficulties in the learning process; this is characterized by the presence of misconceptions, especially in the sub-materials of the principle of continuity and Bernoulli's law (Iswana et al., 2016). In addition, there are still difficulties in understanding dynamic fluid material because the material is abstract, so it requires a clear depiction of fluid properties. Students have difficulty imagining fluid movement when learning dynamic fluid material (Benigno et al., 2015).

The lack of time and facilities to conduct experiments on dynamic fluid material where understanding this material requires experiments both directly and with virtual simulations makes students often find obstacles in finding and proving a concept because learning was only done by lecturing, so learning activities become uninteresting. Students need to be more understanding of the concepts given (Nisrina Najikhah et al., 2021). As previously described, difficulties in learning dynamic fluid material are also found in SMA Negeri 2 Magelang and SMA Negeri 4 Magelang. This statement is based on the needs analysis results obtained by distributing needs questionnaires to teachers and students in both high schools.

The demands of 21st-century physics education and the establishment of the 2013 curriculum as a reference in learning, which has developed from the previous curriculum, are considered capable of facilitating learning activities by teachers and students in a balanced manner. Implementing the 2013 curriculum requires active student participation in the learning process with the teacher as a facilitator, and students are expected to acquire new knowledge through the teacher's facilities (Umam, 2021). According to Sumiharsono & Hasanah (2017), physics learning must prioritize students' experiences through observing, questioning, experimenting, associating, and communicating to enhance students' skills and creativity. Hosnan (2014) states that the application of the scientific approach in the 2013 curriculum can attract students' attention, enabling them to be active in learning physics by the nature of physics through the stages of observing, questioning, experimenting/activities, associating, and disseminating information related to the concepts, laws, or principles acquired. There is a transition from the 2013 curriculum to the 'Merdeka Curriculum' for senior high schools. However, implementing the 'Merdeka Curriculum' has only been applied to learning in grade X, so the 2013 curriculum still provided for grades XI and XII in learning.

According to Taufik (2017), the evolution of time and technology has changed human perspectives on various aspects of life, including education. The ease of accessing academic information on various search pages and concepts that were once only imaginable can now be seen in more engaging and understandable forms, such as animations or videos (Arnila et al., 2021). Teachers are expected to facilitate students by designing learning activities that students can undertake using educational media to maximize effectiveness and efficiency in student learning activities (Arif Muadzin, 2021).

Educational media is a means of conveying information that can help the learning process to be directed and controlled (Ariani & Haryanto, 2010). Based on their types, media is generally divided into audiovisual media, visual media, audio media, and multimedia (Satrianawati, 2018). Among the various types of educational media available, multimedia educational media is the most interesting because it contains comprehensive elements such as videos, images, and simulations (Anggrasari, 2016). The importance of using educational media to support teaching and learning activities was marked by the development of applications with software to assist in developing educational media. Several types of software that can help develop educational media include Articulate Storyline, ISpring, MIT App Inventor, and Lectora Inspire.

Lectora Inspire is software that is more effectively used to develop educational media. The reason for choosing Lectora Inspire is that it is easier to use for creating presentations, online courses, and training than other software because it does not use high-level programming languages (Shalikhah, 2016). Educational media developed with Lectora authoring software can be published in HTML format that can be accessed online through e-learning websites or as a Single File executable that can be accessed offline on all computers/laptops without installing Lectora Inspire software (Wulandari et al., 2017).

Educational media with Lectora Inspire, which contains videos, images, animations, materials, and activity simulations, is designed systematically and interactively. The developed educational media is expected to support the learning of Dynamic Fluids, helping students to have an enjoyable and easily understandable learning experience both in school activities and in independent learning activities without the help of a teacher. Therefore, " Physics Learning Innovation: Revealing the Potential of Lectora Inspire-Based Media with a Scientific Approach" was created.

METHOD

This research is a type of research and development (R&D) carried out in three stages, referring to the ADDIE model (Analysis, Design, Development or Production, Implementation or Delivery, and Evaluations). The stages of research conducted are limited to the analysis stage, design stage, and development stage. The subjects of this study were students of grade XI SMA Negeri 2 Magelang and SMA Negeri Magelang in the 2022/2023 academic year, totaling 30 students in each school.

This study used data collection techniques, such as a needs questionnaire and a learning media assessment questionnaire. The instrument in this study is a needs questionnaire that will be used as a guide in preparing learning media and a learning media assessment questionnaire that has been adjusted based on media assessment criteria, namely the suitability of the material, language, and appearance used in the media. The learning media assessment questionnaire by experts, reviewers, and peer reviewers contains identity, filling instructions, statements, and answer choices using a Likert scale with the specification of the score; namely, the score is score 4 = "Strongly Agree," score 3 = "Agree," score 2 = "Disagree," and score 1 = "Strongly Disagree." Students' learning media assessment questionnaire contains identity, filling instructions, statements, and answer choices using a Guttman scale with the score specification, namely the score 1 = "yes" and score 0 = "no". The data analysis techniques used are qualitative and quantitative data analysis.

Analysis of the results of the response to the questionnaire assessment of learning media conducted by physics education lecturers, peers, and high school physics teachers, as well as trials of high school students grade XI, are interpreted according to the criteria for assessing the quality of learning media in Table 1.

Table 1. Learning Media Quality Interpretation

Skor	Criteria
$M_i + 1,5\ SD_i < x$	Very Good
$M_i + 0,5\ SD_i < x \leq M_i + 1,5\ SD_i$	Good
$M_i - 0,5\ SD_i < x \leq M_i + 0,5\ SD_i$	Good Enough
$M_i - 0,5\ SD_i < x \leq M_i - 0,5\ SD_i$	Not Good
$x < M_i - 1,5\ SD_i$	Very Not Good

Source: Azwar, 2007.

RESULT AND DISCUSSION

RESULTS

Analysis Stage

The analysis stage was carried out using a needs analysis to determine the needs of students and teachers for learning media and to find out how learning conditions at school. Researchers can determine the form and learning media development needed at this stage. The results of the teacher need analysis showed that both teachers considered that learning media such as electronic learning media, presentation media, LKPD, learning videos, and simulations are very important and necessary to be used in physics learning activities, especially in a dynamic fluid material. Both teachers also provide information that the learning media needed contains text, formulas, images, animation, sound, video, simulations, practice questions, and evaluation. According to the results of the analysis of the needs of students, more than half of the respondents have difficulty learning physics, especially in dynamic fluid material.

Design Stage

The design stage aim to design and make the design of learning media products to suit the needs of students and schools by going through the following two steps:

- Preparation of media design. At this stage, concept maps, competency maps, LKPD, material summaries, flowcharts, storyboards, and exercise questions.
- Searching for images, videos, and animations via the internet and YouTube depict phenomena related to dynamic fluid material.

Development Stage

The development stage consists of two stages, namely:

Making Learning Media

The developed learning media has a cover page and a main menu. The main menu has menus that direct to the desired page, namely instructions for using the application, competencies, ideal fluid learning activities, discharge learning activities, continuity principle learning activities, Bernoulli's law learning activities, Bernoulli's law application learning activities, creator, and bibliography.

Assessment and Trial

The draft learning media that has been made will assessed by physics education lecturers, peers, and physics teachers. The assessment of learning media on all aspects consists of 33 items contained in the assessment questionnaire, namely, the material aspect includes 13 questions, the media design assessment aspect includes 13 questions, and the language aspect includes seven questions with a choice of scores 1 to 4. Quantitative data on learning media assessment was obtained through an assessment questionnaire on the entire instrument; the total score of the instrument has an ideal maximum score of 132, a minimum score of 33, an ideal mean (Mi) of 82.5, and an ideal standard deviation (Sbi) of 16.5. After the analysis, the data was presented using the learning media assessment criteria in Table 1. The following is a summary of the overall aspect assessment data presented in Table 2:

Table 2. Summary of Overall Aspect Assessment Data

Score Interval	Category	Frequency	Percentage
$107 < x$	Very Good	6	86%
$91 < x \leq 107$	Good	1	14%
$74 < x \leq 91$	Good Enough	0	0%
$58 < x \leq 74$	Not Good	0	0%
$x \leq 58$	Very Not Good	0	0%

Based on the assessment data on all aspects, Table 2 explains that as many as six people, with a percentage of 86%, gave very good learning media assessment criteria, and one other person gave good learning media assessment criteria.

Quantitative data related to the material aspect is obtained using an assessment questionnaire and analyzed only on the material aspect. The total score of the instrument has an ideal maximum score of 52, a minimum score of 13, an ideal mean (Mi) of 32.5, and an ideal standard deviation (Sbi) of 6.5. The learning media assessment criteria in Table 1 present the analysis. The following is a summary of the material aspect assessment data presented in Table 3:

Table 3. Summary of Material Aspect Assessment Data

Score Interval	Category	Frequency	Percentage
$42 < x$	Very Good	5	71%
$36 < x \leq 42$	Good	2	29%
$29 < x \leq 36$	Good Enough	0	0%
$23 < x \leq 29$	Not Good	0	0%
$x \leq 23$	Very Not Good	0	0%

Based on the assessment data on the material aspect in Table 3, as many as five people, with a percentage of 71%, gave very good learning media assessment criteria, and two other people gave good learning media assessment criteria.

Quantitative data related to the media design aspect is obtained using an assessment questionnaire and analyzed only in the media design aspect. The total score of the instrument has an ideal maximum score of 52, a minimum score of 13, an ideal mean (Mi) of 32.5, and an ideal standard deviation (Sbi) of 6.5. The learning media assessment criteria in Table 1 present the analysis. The following is a summary of the aspect of media design assessment data in Table 4:

Table 4. Summary of Media Design Aspect Assessment Data

Score Interval	Category	Frequency	Percentage
42 < x	Very Good	5	71%
36 < x ≤ 42	Good	2	29%
29 < x ≤ 36	Good Enough	0	0%
23 < x ≤ 29	Not Good	0	0%
x ≤ 23	Very Not Good	0	0%

Based on the assessment data on the media design aspect, Table 4 explains that as many as five people, with a percentage of 71%, gave very good learning media assessment criteria, and 2 other people gave good learning media assessment criteria.

Quantitative data on language aspects are obtained using an assessment questionnaire and analyzed only on language aspects. The total score of the instrument has an ideal maximum score of 28, a minimum score of 7, an ideal mean (Mi) of 17.5, and an ideal standard deviation (Sbi) of 3.5. The learning media assessment criteria in Table 1 present the analysis. The following is a summary of the language aspect assessment data in Table 5:

Table 5. Summary of Language Aspect Assessment Data

Score Interval	Category	Frequency	Percentage
23 < x	Very Good	6	86%
19 < x ≤ 23	Good	1	14%
16 < x ≤ 19	Good Enough	0	0%
12 < x ≤ 16	Not Good	0	0%
x ≤ 12	Very Not Good	0	0%

Based on the assessment data on the language aspect in Table 5, it explains that six people with a percentage of 86% gave very good learning media assessment criteria, and one other person gave good learning media assessment criteria.

The total score of the assessment instrument at the trial stage has an ideal maximum score of 29, a minimum score of 0, an ideal mean (Mi) of 14.5, and an ideal standard deviation (Sbi) of 5. The learning media assessment criteria in Table 1 present the analysis. The following is a summary of one-on-one trial data, small-group and large-group trials presented in Table 6, Table 7, and Table 8.

Table 6. One-on-One Test Data Summary

Score Interval	Category	Frequency	Percentage
22 < x	Very Good	2	100%
17 < x ≤ 22	Good	0	0%
12 < x ≤ 17	Good Enough	0	0%
7 < x ≤ 12	Not Good	0	0%
x ≤ 7	Very Not Good	0	0%

The assessment results of the one-on-one trial in Table 5 show that as many as 100% of respondents or both students gave a very good assessment category. From the assessment results in the small group trial in Table 6, it can be seen that as many as 100% of respondents, or all six students, gave a very good assessment category.

Table 7. Small Group Test Data Summary

Score Interval	Category	Frequency	Percentage
22 < x	Very Good	6	100%
17 < x ≤ 22	Good	0	0%
12 < x ≤ 17	Good Enough	0	0%
7 < x ≤ 12	Not Good	0	0%
x ≤ 7	Very Not Good	0	0%

Table 8. Large Group Test Data Summary

Score Interval	Category	Frequency	Percentage
22 < x	Very Good	59	98%
17 < x ≤ 22	Good	1	2%
12 < x ≤ 17	Good Enough	0	0%
7 < x ≤ 12	Not Good	0	0%
x ≤ 7	Very Not Good	0	0%

DISCUSSION

Improvement of Learning Media Products

The learning media products developed were then improved by considering the suggestions and input given at the previous assessment and trial stages. Improvements to learning media products are made in order to produce better learning media. The first learning media product produced is the first draft product, which will then go through 6 stages of improvement to produce the final product. The first revision stage is according to the suggestions and input given by physics education lecturers as validators. The second stage was revision after going through the assessment stage by peers, namely physics education students, in 2018. The third stage revision was carried out after the assessment stage conducted by physics teachers at SMA Negeri 2 Magelang and SMA Negeri 4 Magelang. The fourth stage, revision, is the first improvement based on students' suggestions and input through the one-on-one trial stage. The fifth revision is the second revision based on students' feedback through the small group trial stage. Revisions made based on students' suggestions and input through the large group trial stage in the sixth stage are the last improvement stage in this series of studies. The sixth stage revision will produce the final product draft, Dynamic Fluid Learning Media.

Discussion of Final Product Results

The final result of the product developed in this study is Lectora Inspire-based learning media with a scientific approach to learning high school physics on dynamic fluid material. The learning media developed has five sub-materials: ideal fluid sub-materials, discharge, continuity principle, Bernoulli's law, and application of Bernoulli's law. The final product developed is a learning media in the form of an application that can be opened using a laptop / PC. The material in the learning media consists of five sub-materials presented as activities in the form of simulations, answering questions, and experiments.

The learning media developed is also equipped with a summary of the material, images, videos, and animations to clarify the depiction of fluid phenomena. Dynamic fluid learning media can be accessed offline or does not require an internet connection, except when downloading learning media through the GDrive link and when accessing simulations. The learning media has a Competency menu containing KD, KI, and Learning Indicators, Application Usage Instructions menu, Material menu, Creator menu, and Bibliography menu. The material menu contains videos and introductory questions, learning activity pages, and material summaries. The learning media developed can be used by students for independent activities at home or as group activities. This learning media can also be used by teachers in the learning process.

Based on the analysis of the dynamic fluid learning media assessment conducted by physics education lecturers, high school physics teachers, peers, and students, the learning media developed meets the criteria very well for use in the learning process.

Dynamic fluid learning media that has been developed has advantages and disadvantages. The advantages of this learning media include: (1) This learning media is provided offline so that students do not need an internet connection, except when accessing activity simulations, (2) The media presents KI, KD, Learning Indicators, Learning Activities, Discussion of Answers to Questions in Student Activities, Summary of Material, Practice Questions, and Bibliography, (3) The media is equipped with five submaterials equipped with introductory videos, prerequisite questions, interactive learning activities, discussion of questions in learning activities, practice questions, simulations, images, animations, and material summaries, (4) Practice questions and questions in learning activities on this media are equipped with feedback on each answer choice, (5) The worksheet on this learning media is equipped with a student answer column so that students can directly fill in the activity sheet directly, (6) Learning media can be used in classical learning and independent learning, (7) Students can carry out learning activities independently because learning media are equipped with instructions for use to facilitate the use and work of activity sheets.

The disadvantages of learning media developed using Lectora Inspire software include: (1) The size of this learning media is quite large, which is about 200 MB; (2) This media can only be opened using a Computer/Laptop because it is available in .exe format; (3) This learning media requires an internet connection to be able to access some simulations linked to the navigation button; (4) The media is not equipped with a feature to be able to send the results of student activities to the teacher so it is necessary to download the worksheet and send it separately, (6) This media cannot store student usage data collectively.

Research Limitations

During the research and development of dynamic fluid learning media, the researcher encountered several obstacles that became limitations of the study. These limitations include: (1) The learning media development was only aimed at determining the assessment criteria for the developed learning media products. (2) The research subjects were limited, consisting only of two high school physics teachers and 60 students from Magelang State High School 2 and Magelang State High School 4. (3) The research was only carried out up to the development stage due to time constraints, so the implementation and evaluation stages could not be conducted.

CONCLUSION

The procedure for developing learning media on dynamic fluid material consists of three stages. The stages carried out to develop learning media in this study are (1) the analysis stage, (2) the design stage, which is carried out by preparing the media design and searching for images, videos, and animations, (3) the learning media development stage which goes through 12 stages consisting of assessment by physics education lecturers, high school physics teachers, peers, and students and the revision stage. The final results of learning media products developed in this study are Lectora Inspire-based learning media applications with a scientific approach to learning high school physics on dynamic fluid material. Specifications of learning media products based on Lectora Inspire with a scientific approach to learning high school physics on dynamic fluid material, namely learning media developed in the form of .exe format applications that can opened by using a PC/laptop. This learning media application comprises features such as application usage instructions menu, competency menu, ideal fluid menu, discharge menu, continuity principle menu, Bernoulli's law menu, Bernoulli's law application menu, creator menu, and bibliography menu. This learning media contains learning activities using questions, simulations, and experiments. The learning media developed can be accessed offline except for access to the activity simulation link. The results of the assessment of Lectora Inspire-based learning media with a scientific approach to learning high school physics on dynamic fluid material meet the criteria of excellent expert judgment in terms of material, design, and language based on the results of the assessment of supervisors, peers, and high school physics teachers, as well as field trials to students.

REFERENCES

Anggrasari, L. A. (2016). Development of learning multimedia in improving the effectiveness of learning in computer and learning media courses at the PGSD IKIP PGRI Madiun study program. *Premiere Educandum: Journal of Basic Education and Learning*, *6*(1), 72-83. https://doi.org/10.25273/pe.v6i01.302

Ariani, N., & Haryanto. (2010). *Multimedia learning at school*. Jakarta: Prestasi Pustaka.

Arif Muadzin, A. M. (2021). Conception of the teacher's role as a facilitator and motivator in the learning process of Islamic religious education. *Journal of Islamic Education*, *7*(2), 171-186. https://doi.org/10.37286/ojs.v7i2.102

Arnila, R., Purwaningsih, S., & Nehru, N. (2021). Development of stem-based e-modules (science, technology, engineering and mathematics) on static fluid and dynamic fluid material using kvisoft flipbook maker software. *Edumaspul: Journal of Education*, *5*(1), 551-556. https://doi.org/10.33487/edumaspul.v5i1.1216

Azwar, S. (2010). *Research methods (10th printing).* Yogyakarta: Learning Library.

Benigno, I., Djoko Wirjawan, J. V., & Indrasutanto, T. (2015). Development of bilingual physics learning media "VOCARELI" on the subject of dynamic fluid (Pages 49 to 52). *Indonesian Journal of Physics*, *19*(55), 49-52. https://doi.org/10.22146/jfi.24374

Hosnan, M. (2014). *Scientific and contextual approaches in 21st century learning: the key to successful implementation of the 2013 curriculum*. Bogor: Ghalia.

Iswana, L. F., Setyarsih, W., & Kholiq, A. (2016). Identification of students' misconceptions in dynamic fluid material through a three-tier diagnostic test instrument. *Journal of Physics Education Innovation (JIPF)*, *5*(3), 170-173.

Lusiani, Muliawan, A., Ratnadewi, Satria, E., Taba, H. T., Tanwir, Widyastusi, H. (2021). *Applied physics*. Yogyakarta: Zahir Publising.

Nisrina Najikhah, Akhdinirwanto, R. W., & Ashari, A. (2021). Design of android-based waterwheel props in dynamic fluid learning. *Journal of Science Education Innovation (JIPS)*, *2*(1), 9-17. https://doi.org/10.37729/jips.v2i1.585

Satrianawati. (2018). *Media and learning resources*. Yogyakarta: Deepublish.

Shalikhah, N. D. (2016). Utilization of lectora inspire application as interactive learning media. *Jurnal Cakrawala Pendidikan 9*(1), 101-115. google scholer

Sumiharsono, R., & Hasanah, H. (2017). *Learning media*. Jember: CV Pustaka Abadi.

Umam, K. (2021). Curriculum and competency demands of the 21st century. *Indonesian Journal of Education*, *1*(3), 511-526. https://doi.org/10.14421/njpi.2021.v1i3-4

Young, H. D., & Freedman, R. A. (2002). *University physics tenth edition volume one*. Jakarta: Erlangga.