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Developing Science, Technology, Religion, Engineering, Art, and Mathematics (STREAM) Based Lectora Inspire Learning Medium on Basic Chemical Laws Lesson

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ABSTRACT. This research aimed at developing chemistry learning media by using Lectora Inspire with STREAM approach and finding out validity and practicality of the media developed. Research and Development method was used in this research with DDR (Design and Development Research) model consisting of analysis, design, and evaluation steps. The instruments of collecting data were interviews, validity test questionnaire, practicality test, and student response. The samples were 15 students selected by using random sampling technique. The validation results showed that the percentages were 82.10% (very valid) by material experts and 70% (valid) by media experts. STREAM Based Lectora Inspire learning medium was appropriate to be used 94.38% (very practical) by practicality experts and 88.93% (very practical) by students. Based on the results obtained from validation and limited appropriateness tests conducted, STREAM Based Lectora Inspire learning medium on Basic Chemical Laws lesson was appropriate to be used.

Keywords: Lectora Inspire; STREAM; Basic Chemical Laws

INTRODUCTION

The use of technology in education is a system that can be utilized to support the success of educational goals. The use of technology in education aims to attract students' attention and make learning more interesting and effective. One example of the use of technology in education can be seen in the teaching and learning process, namely the use of digital-based learning media. According to Megalina et al., 2020, the use of learning media in the learning process can increase new desires and interests, create enthusiasm and interest in learning activities, and even have psychological influences on students. Motivation can increase passion and enthusiasm for learning. Students who have strong motivation will have more energy to carry out the learning process. Motivation will determine the intensity of students' learning efforts (Sari & Ganing, 2021)

Learning media is one of the learning components that cannot be separated from the learning process and has an important role in teaching and learning activities. Mastery of learning media for a teacher is important, this is because with learning media teachers can provide varied and innovative learning processes. The duration of delivering lessons will also be shorter, because the teacher does not have to explain the content of the lesson repeatedly. By using learning media, the time to convey the message becomes faster and the possibility of getting the message across becomes easier. Because, media can reduce or even eliminate the element of verbalism in the classroom, from the abstract to the more real. Educators must create a comfortable learning atmosphere so that it can lead to effective and efficient teaching and learning activities. Likewise, the learning process will be more interesting for students if the learning sources are not just books. The basis for using educational media in teaching and learning can be found in the Al-Quran, Surah An-Nahl verse 44:

Meaning: "Explanations (miracles) and books. And We have sent down to you the Qur'an, so that you may explain to people what has been revealed to them, and that they may reflect on it." (QS An-Nahl verse 44) (Gunawan & Pasaribu, 2022:92). Based on the verse above, Allah gives an example that the revelation of the Qur'an to us humans is a tanbihat (reminder) so that we can tell others what Allah has revealed to us in the form of laws, shari'ah and explanations . This law is known as Tafsir Quraisihab al-Misbah indicating that the word Al-żikr is the Qur'an itself, which is the opposite of nasjan or forgetting, so that the Qur'an has the meaning of a reminder for people who have the gift of forgetting, I forget their duties, forget His instructions and forget His warnings (Gunawan & Pasaribu, 2022:92). Based on the explanation of the meaning and intent above, Hamka is of the opinion that this verse contains both an explanation and a warning for humanity. And this verse also explains the obligations of the Prophet Muhammad SAW. namely, as a messenger of warning, which in the Qur'an takes the form of messages, instructions and explanations, which are systematic orders from Allah to humans. The Qurayshhab also believed that the Messenger of Allah received the Al-Qur'an indirectly as an authority to convey it to his people by teaching attitudes and actions to humans related to God's teachings, commands and prohibitions contained in the Al-Qur'an and in the form of words, actions and human actions towards the environment (Gunawan & Pasaribu, 2022:93). Chemistry is a science that is often associated with the essential properties of substances. Chemistry deals with rather complex systems, starting with atoms, molecules, and their compounds. Correct understanding of concepts is the basis for understanding chemical facts, laws, principles and theories. specifically the material on the basic laws of chemistry which contains sub-chapters on the law of conservation of mass, the law of constant proportions, the law of multiple proportions, and Gay Lussac's law of volume comparisons. In the learning process, teachers often experience difficulties in explaining subject matter to students related to the comparison of concepts, for example when explaining the implications of each basic law of chemistry if they do not use supporting media that makes the sound of each basic law seem more real so that it's easy to understand. This results in students' understanding of the basic legal material of chemistry decreasing. According to Megalina et al., 2020, the less able students are to understand and master a concept, especially in chemistry subjects related to the basic laws of chemistry which are the basis for understanding other related chemistry concepts, the more difficult it will be to understand new concepts.

New innovations are needed as an effort to overcome the problems described above. One of the efforts made by teachers is the use of different resources such as software and platforms used in the teaching process. Lectora Inspire is an application program that can be used to create presentations and learning media. The advantage of Lectora Inspire is that it is very user friendly or easy to use in creating learning media. Lectora Inspire is here to provide convenience in the process of creating interactive learning media. Basically, Lectora Inspire is not specifically intended for creating interactive learning media, because the software is intended for developing content in e-learning, but Lectora Inspire is equipped with features designed in such a way as to make it easier for users to create interactive learning media.

Lectora Inspire is an electronic learning (e-learning) development software that is very easy to apply and apply because it does not require understanding of complex and difficult programming languages. This convenience can be seen with the Design Wizard feature, this feature greatly simplifies the process of creating interactive learning media because with this feature ordinary users will be able to easily create initial designs for interactive learning media by just following a few steps provided. Another convenience of Lectora Inspire is that users do not need a script to be able to create interactive learning media, just use the options provided. Lectora Inspire has several advantages compared to Microsoft Power Point. One of the advantages is that teachers can create teaching materials containing animations and videos as well as integrated quizzes/test materials accompanied by automatic scoring which can be saved in the form of a single executable file (exe). The types of questions in Lectora Inspire are varied, there are true and false questions, multiple choice questions, short answer questions, essay questions, fill-in-the-blank questions, matching

questions, drag and place questions, and point determination questions. Apart from that, Lectora Inspire also has a demo version which can be downloaded easily on the official website and this software is also compatible with various operating systems that are currently widely used, such as Windows XP, Windows 7, Windows 8, and Windows 10 .

Apart from efforts to select effective learning media, the approach to learning is also an important factor in efforts to increase the achievement of learning goals. STREAM is a learning approach developed from STEAM with science as the subject that integrates engineering design, the use of technology associated with religious aspects, as well as aspects of art and mathematics. According to Azizah et al., 2019 the implementation of the STREAM approach will certainly complement the 5 pillars of education in Indonesia in order to achieve national education goals, namely Learning to know, Learning to do, Learning to be, Learning to live together in peace, and learning to strengthen faith, devotion, and noble morals.

METHOD

This research uses research and development methods or Design and Development Research (DDR). Design and Development Research (DDR) is a research method that studies the design, development and evaluation process to create new products or modify existing products in learning or non-learning activities (Caesaria et al., 2020:45). DDR (Design Development Research) is a research model that aims to improve practical education through systematic and interactive reviews, design analysis, development and evaluation based on collaboration between researchers and practitioners in the real world, leading to design principles or theories. DDR is a systematic study of the design, development, and evaluation process with the goal of establishing an empirical basis for the creation of new products. There are 3 steps in the DDR model, namely: 1. Needs analysis 2. Design and development 3. Evaluation (Richey et al., 2004: 102). Held in May of the 2023/2024 academic year, even semester in class The population in this study were chemistry teachers and students in class X, with a sample of 1 chemistry teacher and 15 students. The sampling technique used is simple random sampling, where the sampling technique is carried out randomly, every person in the population has the same opportunity to act as a sample (Sundayana, 2014). This research uses several methods to collect data, namely observation, questionnaires and interviews. With technical analysis, namely qualitative and quantitative.

The steps in the DDR development model begin with identifying problems, determining research objectives, designing and developing research products, testing research products, evaluating research products, and communicating research test results (Hanafi & Ma'rifah, 2018: 53).

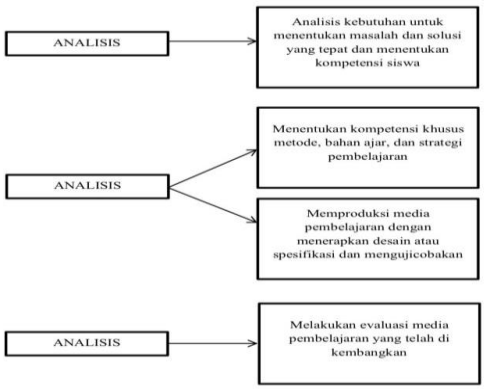

Figure 1.1 DDR *steps Storyboardis*

a picture or sketch of a product that will be made by arranging it sequentially and systematically. In this study, the product made is the Lectora Inspire learning media, here is the storyboard of the media:

Menu Cover or Initial Display

Cover	Home	Instruction	Exit
Logo of UIN Suska Riau	Thesis title Expert Photos		
	By:		

Table 1 Menu Cover

User Guide Menu

	Home	Instruction	exit
	The Usage Instructions menu contains How to use media. Consists of icons and navigation buttons		

Table 2 User Instructions Menu

Competency Menu

	Home	Instruction	exit
	The competency menu contains Learning Objectives sourced from Unggul Sudarmo's book Independent Curriculum		

Table 3 Competency Menu

STREAM Menu

	Home	Instruction	Exit
The STREAM menu contains Explanation, namely: 1. S [SCIENCE] : The basic laws of chemistry are the laws used to underlie chemical calculations and the quantitative relationships of reactants and products in chemical equations. 2. T [TECHNOLOGY] : Cooking meat using a pressure cooker is an example of the application of Gay-Lussac's law in everyday life, because when the stove temperature is increased, the pressure in the pan will also increase so that the meat will cook faster. This is in accordance with Gay Lussac's law where the increase in temperature is directly proportional to the pressure in the pan at a constant volume. Meanwhile, a water heater has a working principle similar to a pressure cooker where cold water in the water tank will be heated by a heating element installed at the top and bottom of the water tank. The hot water produced will be released through the outlet nozzle so that we can use the hot water. However, when the system and pressure relief valve in the water heater do not work, the steam produced continuously can damage the heater. This is in accordance with Gay Lussac's law where an increase in temperature in the water heater will cause the pressure to increase. (juniardi wilman, 2023) 3. R [RELIGION]: The basic laws of chemistry cannot be separated from religion and the two are interrelated, as in QS. Al-Jin: 28 that everything has been calculated. Likewise in the basic laws of chemistry, all reactions and phenomena that occur have been calculated well. (KuncoroHadi. 2021) 4. E [ENGINEERING]: Technique can be interpreted as a method or steps that can be used to solve the problems found. The technique in making this media lies in the editing and design process of each slide in the Lectora Inspire application. 5. A [ART] : Combining appreciation and creativity of beauty in the form of audio, video, and other media produced through physical and non-physical forms. Students are asked to create aromatherapy candle making projects with various creations according to their creativity such as various shapes, colors, and aromas of candles in the form of videos that will later be uploaded on their respective Instagrams. 6. M [MATHEMATIC] : In studying the basic laws of chemistry, we need to know the sound of the four basic laws of chemistry (Lavoiser's basic law, Proust's basic law, Dalton's basic law, Gay Lussac's basic law) and know how to calculate the four basic laws. (can use 1 page or more)			

Table 4 STREAM Menu

Teaching Material Menu

	Home	Instruction	exit
	The Material menu containsExplanation of the material being taught, supporting images and animations. Among them: 1. Introduction 2. Lavoisier's Law 3. Proust's Law 4. Dalton's Law 5. Gay-Lussac's Law 6. Example questions and discussions 7. Application in daily life 8. Enrichment activities (can use 1 page or more)		

Table 5 Teaching Material Menu

Evaluation Menu

	Home	Instruction	exit
	The Evaluation menu containsAmong them: 1. Student identity cover 2. Questions 1-5 and their answers 3. Competency test results (can use 1 page or more)		

Table 6 Evaluation Menu

Menu Author

	Home	Instruction	Exit
	The author menu containsAmong them: 1. Photo 2. Author's personal data		

Table 7 Author Menu

RESULT AND DISCUSSION

This research is a type of Design, Development and Research research also known as DDR is a research method that focuses on the process of designing, building, and evaluating a product to identify better products or to classify products that have been used which was initiated by Richey in 2004. The product to be developed is a learning media based on Lectora Inspire using the Science, Technology, Engineering, Art and Mathematics (STREAM) approach on the Basic Laws of Chemistry material, and testing the product with the hope that this media can be used as teaching materials for teachers and can be used as additional references for students. Lectora Inspire learning media based on STREAM which has been declared feasible and valid by experts can then be tested in schools.

Practicality Test of STREAM-Based Lectora Inspire Learning Media by Chemistry Teachers.

In the practicality test of the STREAM-based Lectora Inspire learning media on the basic laws of chemistry material, it was carried out by 1 chemistry teacher. The results of the teacher's assessment of the STREAM-based Lectora Inspire learning media can be seen in Table 8 below:

Aspect	Question Items	Score	Presentation	Criteria
Relevance of the material	1,2,3,4	20	100%	Very practical
Organizing the material	5,6,7,8	18	90%	Very practical
Language	9,10	10	100%	Very practical
Effects on Learning Strategies	11.12	8	80%	practical
STREAM	13,14,15,16,17 ,18	28	93.33%	Very practical
Evaluation	19,20,21	13	86.66%	Very practical
Software engineering	22,23,24,25,26	24	96%	Very practical
Visual Media Display	27,28,29,30,31 ,32	30	100%	Very practical
Amount		151	94.38%	Very practical

Based on table 8, it can be concluded that the STREAM-based Lectora Inspire learning media on the basic chemical law material is categorized as "very practical" with an overall percentage of 94.38%. The practicality test assessment questionnaire by chemistry teachers consists of 8 aspects and 32 questions. The calculation scale for instrument validation is arranged according to a rating scale with a scale of 1 to 5. Based on the assessment provisions, 5 strongly agrees and 1 strongly disagrees.

The trial was conducted directly by showing the STREAM-based Lectora Inspire learning media to students, then giving students the opportunity to see, listen to and understand the Lectora Inspire learning media. Furthermore, students were asked to provide an assessment of the STREAM-based Lectora Inspire learning media presented by filling out the questionnaire that had been given. An analysis of how students assessed the STREAM-based Lectora Inspire learning media on the basic laws of chemistry material can be seen in Table 9 below.

No	Question	Percentage	Criteria
1	The appearance and design of the STREAM-based Lectora Inspire learning media is attractive	89.33%	Very practical
2	Videos and images on the STREAM-based Lectora Inspire learning media are interesting	89.33%	Very practical
3	STREAM-based lectora learning media increases my motivation and enthusiasm for learning	90.67%	Very practical
4	This STREAM-based Lectora Inspire learning media is easy to use.	81.33%	Very practical
5	Ease of operation of STREAM-based Lectora Inspire learning media	89.33%	Very practical
6	The material presented in the STREAM-based Lectora Inspire learning media is easy to understand.	84%	Very practical
7	Videos and images on the STREAM-based Lectora Inspire learning media help me in the process of understanding the material.	90.67%	Very practical

8	Practice questions and discussions in the STREAM-based Lectora Inspire learning media helped me in the process of understanding the material.	90.67%	Very practical
9	The writing on the STREAM-based Lectora Inspire learning media is clear and easy to read.	92%	Very practical
10	The language used in the STREAM-based Lectora Inspire learning media is easy to understand.	92%	Very practical
Amount		**88.93%**	**Very practical**

Based on Table 9, it can be concluded that the results of the student responses to the STREAM-based Lectora Inspire learning media, the percentage obtained was 88.93% and was included in the "very practical" category. The conclusions of the comments and suggestions from students are: STREAM-based Lectora Inspire learning media is very helpful in the learning process and is more supportive in learning. The assessment can be seen in Table 10 below:

Table 10 Results of Material Expert Validation

Aspect	Question items	Score	Percentage	Criteria
Relevance of Material	1, 2, 3, 4	16	80%	Valid
Organizing Material	5, 6, 7, 8,	16	80%	Valid
STREAM Approach	9, 10, 11, 12, 13, 14	26	86.66%	Very Valid
Language	15, 16	8	80%	Valid
Evaluation	17, 18, 19	12	80%	Valid
Amount		78	82.10%	Very Valid

The validation assessment questionnaire from the material expert consists of 5 aspects and 19 questions. The calculation scale for instrument validation is arranged according to a rating scale with a scale of 1 to 5. Based on the assessment provisions, 5 strongly agrees and 1 strongly disagrees. The overall percentage value can be calculated using the formula:

$$\text{Validity percentage} = \times 100\% \frac{\text{skor yang diperoleh}}{\text{skor maksimal}}$$
$$= \times 100\% \frac{78}{95}$$
$$= 82.10\%$$

This STREAM-based assessment includes aspects of visual media display, software engineering aspects, language aspects, images, aspects of effects on learning strategies, and STREAM aspects. The assessment results can be seen in table 11 below:

Table 11 Media Expert Validation Results

Aspect	**Question items**	**Score**	**Percentage**	**Criteria**
Visual Media Display	1,2,3,4,5,6	20	66.66%	Valid
Software engineering	7,8,9,10,11	18	72%	Valid
Language	12.13	7	70%	Valid
Picture	14,15,16	12	80%	Valid
STREAM Approach	17,18,19,20,21,22	20	66.66%	Valid
Amount		**77**	**70%**	**Valid**

The validation assessment questionnaire from media experts consists of 5 aspects and 22 questions. The calculation scale for instrument validation is arranged according to a rating scale with a scale of 1 to 5. Based on the assessment provisions, 5 strongly agrees and 1 strongly disagrees. The overall percentage value can be calculated using the formula:

$$\text{Validity percentage} = \times 100\% \frac{\text{skor yang diperoleh}}{\text{skor maksimal}}$$
$$= \frac{77}{110} \times 100\%$$
$$= 70\%$$

Table 11 shows the results of media expert validation on all aspects, which has a percentage of 70%. The STREAM-based Lectora Inspire learning media that has been declared feasible and valid by experts can then be tested in schools.

Practicality Test of Lectora Inspire Learning Media Based on STREAM by Chemistry Teachers. In the practicality test of the STREAM-based Lectora Inspire learning media on the basic chemical law material, it was conducted by 1 chemistry teacher in a high school. The results of the teacher's assessment of the STREAM-based Lectora Inspire learning media can be seen in Table 12 below:

Aspect	**Question Items**	**Score**	**Presentation**	**Criteria**
Relevance of the material	1,2,3,4	20	100%	Very practical
Organizing the material	5,6,7,8	18	90%	Very practical
Language	9,10	10	100%	Very practical
Effects on Learning Strategies	11.12	8	80%	practical
STREAM	13,14,15,16,17 ,18	28	93.33%	Very practical
Evaluation	19,20,21	13	86.66%	Very practical
Software engineering	22,23,24,25,26	24	96%	Very practical
Visual Media Display	27,28,29,30,31 ,32	30	100%	Very practical
Amount		**151**	**94.38%**	**Very practical**

Based on table 12, it can be concluded that the STREAM-based Lectora Inspire learning media on the basic chemical law material is categorized as "very practical" with an overall percentage of 94.38%. The practicality test assessment questionnaire by chemistry teachers consists of 8 aspects and 32 questions. The calculation scale for instrument validation is arranged according to a rating scale with a scale of 1 to 5. Based on the assessment provisions, 5 strongly agrees and 1 strongly disagrees.

Next, the participants were asked to provide an assessment of the STREAM-based Lectora Inspire learning media presented by filling out the questionnaire that had been given. An analysis of how students assessed the STREAM-based Lectora Inspire learning media on the basic chemical law material can be seen in Table 12 below.

No	**Question**	**Percentage**	**Criteria**
1	The appearance and design of the STREAM-based Lectora Inspire learning media is attractive	89.33%	Very practical

2	Videos and images on the STREAM-based Lectora Inspire learning media are interesting	89.33%	Very practical
3	STREAM-based lectora learning media increases my motivation and enthusiasm for learning	90.67%	Very practical
4	This STREAM-based Lectora Inspire learning media is easy to use.	81.33%	Very practical
5	Ease of operation of STREAM-based Lectora Inspire learning media	89.33%	Very practical
6	The material presented in the STREAM-based Lectora Inspire learning media is easy to understand.	84%	Very practical
7	Videos and images on the STREAM-based Lectora Inspire learning media help me in the process of understanding the material.	90.67%	Very practical
8	Practice questions and discussions in the STREAM-based Lectora Inspire learning media helped me in the process of understanding the material.	90.67%	Very practical
9	The writing on the STREAM-based Lectora Inspire learning media is clear and easy to read.	92%	Very practical
10	The language used in the STREAM-based Lectora Inspire learning media is easy to understand.	92%	Very practical
Amount		**88.93%**	**Very practical**

Based on Table 12, it can be concluded that the results of the student responses to the STREAM-based Lectora Inspire learning media, the percentage obtained was 88.93% and was included in the "very practical" category. The conclusions of the comments and suggestions from students are: The STREAM-based Lectora Inspire learning media is very helpful in the learning process and is more supportive in learning.

The product revision stage is the third stage of the DDR development model. At this stage, revisions are made to the product that is designed based on the results of the initial (limited) trial. This product revision stage aims to obtain a better product that can be tested in a wide field. Although the Lectora Inspire media is stated as practical by teachers and students, there are still some suggestions and input from chemistry teachers for improving the Lectora Inspire media on the basic chemical law material. Suggestions and input from chemistry teachers are that the development of the Lectora Inspire media is actually good, because it can be one of the things that motivates students to learn, but the sentences/language of the explanation should be simplified again, not monotonous like the language of books, so that when children see this media they will be interested again. More pictures related to the basic laws of chemistry can be added. Based on the assessment of material experts, media experts, practicality tests by teachers and student response tests, the following overall data were obtained:

Table 13 Overall Assessment

Evaluation	Presentation	Category
Subject matter expert	82.10%	Very valid
Media expert	70%	Valid
Teacher practicality test	94.38%	Very practical
Learners	88.93%	Very practical

Based on the overall assessment data, it can be concluded that the STREAM-based Lectora Inspire learning media product on the basic chemical law material is suitable for use as a learning

medium. The STREAM-based Lectora Inspire learning media that was developed still has weaknesses, such as only being accessible on laptops and mobile phones. The success of using Lectora Inspire depends on the independence of students and their motivation in utilizing this media. Meanwhile, the advantages of the STREAM-based Lectora Inspire learning media are that it can be accessed repeatedly without a quota and can be opened anytime and anywhere, with Lectora Inspire access not limited by time and place. This media also provides instructions for use with the aim of making it easier for students to understand how to use this media.

CONCLUSION

STREAM-based Lectora Inspire learning media on the Basic Law of Chemistry material is a DDR development research consisting of 4 stages, namely the needs analysis stage, the design and development stage, and the research stage. The final format results are in the form of a zip that can be accessed via laptops and smartphones without being limited by time and place. STREAM-based Lectora Inspire learning media is suitable for use as a learning medium based on the validation criteria that have been set. Based on the results of the validation of material experts, the percentage was 82.10% (Very valid), media experts 70% (valid). STREAM-based Lectora Inspire learning media is suitable for use as a practical expert of 94.38% (very practical) and students 88.93% (very practical) and Based on the results obtained from the validation and limited feasibility trials that have been carried out, the STREAM-based Lectora Inspire learning media is declared suitable for use.

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