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The development of interactive multimedia based lectora inspire on chemical bonding material for grade X senior high school

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ABSTRACT

This research aims to determine to develop interactive multimedia based on the Lectora Inspire on chemical bonding for grade X Senior High School an, knowing the feasibility of developing interactive multimedia based on the Lectora Inspire on chemical bonding materials in accordance with the BSNP form assessment criteria. The type of research is (R&D) by implementing 4-D development model by Thiagarajan. The stages are define, design, develop, and disseminate. The results of media validation of the 3 validators showed that the product was included in the "Very Feasible" category because the average percentage of validation results from 3 validators was above 90%, namely 95.33%; 91.7% and 100%. The results of material validation of the 3 validators showed that the material was included in the "Very Feasible" category because the average percentage of validation results from 3 validators was above 95%, namely 97%; 97% and 95.7%. From the result, it can be conclude that the Interactive Multimedia Based Lectora Inspire on Chemical Bonding Material for Grade X Senior High School is appropriate to implement for teaching and learning process.

Keywords: Lectora Inspire, Research and Development, 4D Model, Chemical Bonding

INTRODUCTION

In this modern era, the use of information and communication technology has become an alternative in the development of interactive multimedia because of its attractive appearance in terms of color, writing, animation, video simulation, images, sounds, material concepts and summaries that involve many senses in learning. Technology-based learning media is very easy to access via mobile phones or computers anywhere and anytime during this online learning (Vilasta, 2018). The use of interactive learning media is expected to help students understand and accept the learning process carried out by the teacher (Sardiman, 2011).

One interactive multimedia that can be used is Lectora Inspire. Lectora Inspire is an electronic learning development software (e-learning) that is relatively easy to apply or implement because it does not require an understanding of sophisticated programming languages. The communication process must be created in a two-way manner through the delivery and exchange of messages between teachers and students. Messages or information can be in the form of knowledge, skills, abilities, ideas, or experiences that are poured and displayed to students with Lectora Inspire (Mas'ud, 2013).

Lectora Inspire-based interactive multimedia development research has been carried out and the result mostly give positive impact to the students. According the research conducted (Hardhy et al., 2015), state that interactive multimedia based Lectora Inspire is interesting, effective, and suitable to be used as a media for chemistry learning. Another research conducted by (Purnawanti, 2017), state that there are differences in student learning outcomes between before and after being given learning media based on Lectora Inspire. In addition, students become more enthusiastic and active in the learning process.

The concepts in chemical bonds are abstract, so they are difficult to apply contextually. The understanding of concepts in chemical bonding material for most high school students is in the low category. Most students do not fully understand the material of chemical bonds. Complete understanding of chemical bonding material is needed to reduce the percentage of misconceptions in students (Safitri et al., 2018).

Based on the results of the needs analysis through an interview with the headmaster and 2 chemistry teachers of MAN 3 Langkat, the headmaster informed that the development of digital-based learning media is very necessary during this era, at this time the Ministry of Religion has intensified the digital madrasa program. However, the development of learning media is still not optimally carried out by teachers. Two chemistry teachers state that, the learning media used at the school usually use books, powerpoints, or occasionally use ChemSketch to present chemical bonding material. The chemistry teacher has never used interactive learning media based on Lectora Inspire on chemical bonding material. According to them, using interactive multimedia will greatly help students to understand the subject matter and make students not bored in learning activities, because interactive learning media presents learning content such as text, motion pictures, animated videos, audio, quizzes, and also interesting games. Based on the results of this needs analysis, it can be concluded that the MAN 3 Langkat school has never developed interactive multimedia based on Lectora Inspire on chemical bonding material.

Based on the background described above, the purpose of this research is to: (1) To develop interactive multimedia based on the Lectora Inspire on chemical bonding for grade X Senior High School and (2) Knowing the feasibility of developing interactive multimedia based on the Lectora Inspire on chemical bonding materials in accordance with the BSNP form assessment criteria.

RESEARCH METHOD

This research used method of research and development (R and D). Research and development is the research method that use to produce specific product and test the effectiveness of the product. The product is not always in the form of hardware (object), like book, stationary, and other learning tools. However, it can also be in the form of software (Sugiyono, 2018). 4D development model was applied by Thiagarajan. Stage of 4D development model consists of: 1) Define; 2) Design; 3) Develop; and 4) Disseminate. In this research, disseminate was not carried out because the purpose of this study was to develop interactive multimedia based Lectora Inspire on chemical bonding materials. So that it can be said that the researcher uses the modified of 4D model development, where only the define stage, design stage and development are carried out.

This research conducted in MAN 3 Langkat, which is located at Proklamasi street No. 54, Kwala Bingai, Stabat, Langkat from November 2021 until March 2022. The population in this research were students in class X Science of MAN 3 Langkat. The sample in this study were student of class X Science 4 of MAN 3 Langkat. In this research the sampling technique that will be used is simple random sampling technique.

The instrument validation used for media and material experts is a questionnaire. This instrument is used to obtain data regarding the assessment and opinion of the validator on the media and material based on the references media that is compiled so that becomes a guide and in revising the media. Validation sheet of media and material arranged by using Likert Scale (a scale of 5). The provided answer options there are 5 answers, namely: 5 (Very Good), 4 (Good), 3 (Enough), 2 (Bad), 1 (Very Bad). With a Likert scale, the variables to be measured translated into variable indicators. These indicators are used as points refuse in arranging instrument items which can be statement or question (Sugiyono, 2018).

To conduct media and material validity analysis by material and media expert developed using a Likert scale and obtained by:

1) Determine the maximum score
2) Determine the score obtained by adding up the scores of each validator
3) Determine the percentage of validity

$$\textbf{Percentage of validity} = \frac{\boldsymbol{score\ that\ obtained}}{\boldsymbol{maximum\ score}} \times \mathbf{100}\ \%$$

Learning media that has been developed is assessed for its feasibility with material and media validation sheets by material experts and media experts. As a provision in providing meaning in media validation decision making.

Table 1 Media and Material Validation Criteria

Achievement Degree	Qualification	Information
81 - 100 %	Very feasible	Need not be revised
61 - 80 %	Feasible	Need not be revised
41 - 60 %	Enough feasible	Need revised
21 - 40 %	Less feasible	Need revised
0 - 20 %	Not feasible	Total revised

RESULTS AND DISCUSSION

Define Stage

Define is the stage to determine and define learning needs (Rochmad, 2012). This stage includes 5 main points, namely:

a. Front end analysis

To determine students' basic problems in chemistry subjects on chemical bonding material. This stage was carried out by researchers through observation by interviewing 2 chemistry teachers at MAN 3 Langkat. Based on the analysis result by interviewing 2 chemistry teachers at MAN 3 Langkat, it was found that, teachers have to be more creative in presenting learning media, so that students are more interested in participating in learning. In addition, at MAN 3 Langkat, the digital madrasa program is being intensified. The learning media used by teachers to teach chemical bonding materials are powerpoints, learning videos taken from Youtube or occasionally teachers use ChemSketch. Teachers have never made interactive multimedia based on Lectora Inspire on chemical bonding material so that the use of interactive and digital-based learning media among students is not optimal for the learning process. The achievement of learning objectives is still not optimal.

b. Student analysis

To determine student characteristics including student needs and also student learning characteristics so that researchers can determine the type of development that is appropriate for students. This stage was carried out by researchers through observation by interviewing 10 students of class X Science at MAN 3 Langkat. Based on the analysis results of interviews with 10 students of class X Science at MAN 3 Langkat, it was found that, if the learning media used is just ordinary, it makes students bored and sleepy in following the learning process. Most students like it if the learning media used is interactive based, where there is a response from the user of the media. Students also like it if the display is attractive, there are sound effects, there are animated motion pictures, there are animated videos, and there are games. Students have never used interactive learning media based on Lectora Inspire. Some students do not like chemical bonding materials because the material is difficult to understand, less interesting, and boring. Students also state that chemical bond learning has been delivered only using textbooks and video from Youtube.

c. Concept analysis

To identify the main concepts or material that must be taught based on the syllabus to systematically compile chemical bonding material. The concepts of material that must be taught in chemical bonding materials include: (1) Explain the rules octet and duplet relating to the stability of elements, (2) Draw the Lewis symbol and Lewis structure, (3) Identify ionic bonds, covalent bonds, coordination covalent bonds, and metallic bonds, (4) Explain the difference between ionic bonds, covalent bonds, coordinating covalent bonds, and metallic bonds, and (5) Identify the process of forming ionic bonds, covalent bonds, coordinating covalent bonds, and metallic bonds.

d. Task analysis

The task analysis stage is carried out by analyzing the overall competencies required in subjects that are adapted to the basic competencies in chemical bonding material, namely: Comparing the processes of forming ionic bonds, covalent bonds, coordinating covalent bonds and metallic bonds and processing and analyzing the comparison of ionic bond formation processes, covalent bonds, coordination covalent bonds, and metallic bonds.

e. The formulation of learning objectives

To produce learning objectives based on task analysis and concept analysis that have been carried out. The learning objectives of chemical bonding materials are: (1) Students are able to

explain the rules of octet and duplet, (2) Students are able to describe the Lewis symbol and Lewis structure on an element or molecule, (3) Students are able to explain the process of forming ionic bonds, (4) Students are able to explain the process of forming covalent bonds, (5) Students are able to explain the process of forming a coordinating covalent bond, (6) Students are able to explain the process of metal bond formation, and (8) Students are able to explain the difference between ionic bonds, covalent bonds, coordinating covalent bonds, and metallic bonds.

Design Stage

a. Media Selection

Media chosen in this development research is in the form of interactive multimedia based on the Lectora Inspire. Interactive multimedia based Lectora Inspire was chosen based on the front-end analysis by interview 2 chemistry teachers at MAN 3 Langkat, stated that this interactive multimedia has never been used by the teacher. In addition, at MAN 3 Langkat the digital madrasa program is being intensified. Beside that, Lectora Inspire is an E-Learning software that is quite complete and suitable for creating learning media. Lectora Inspire can be used easily by teachers so that teachers can create learning media according to the field of study being taught. Lectora can be used to combine flash, record video (Sudjana & Rivai, 2009).

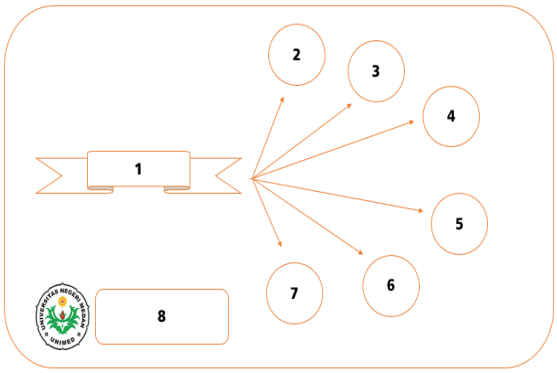
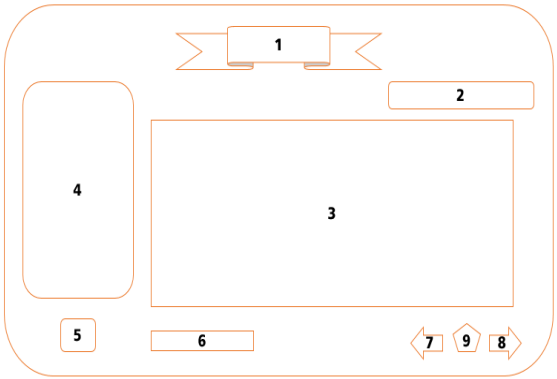
b. Format Selection

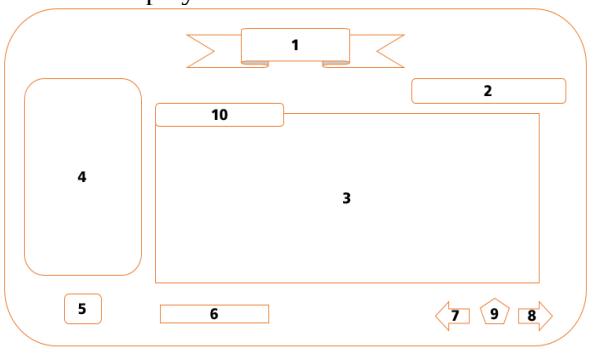
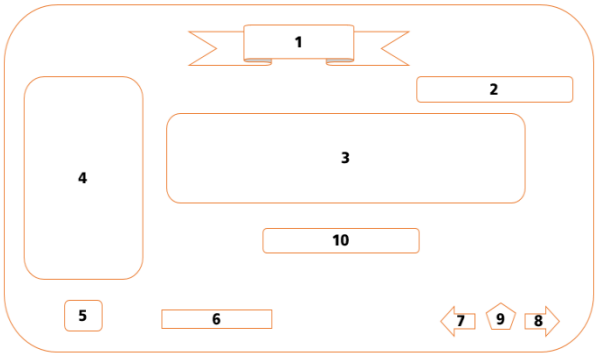
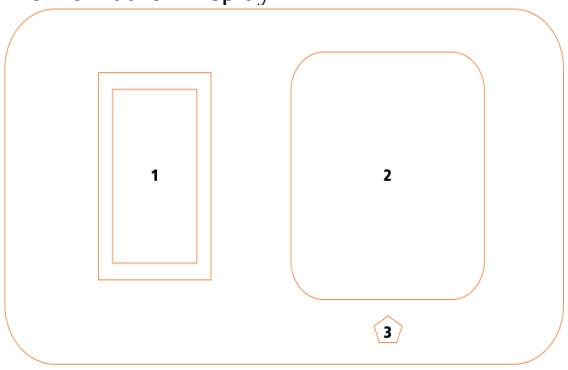
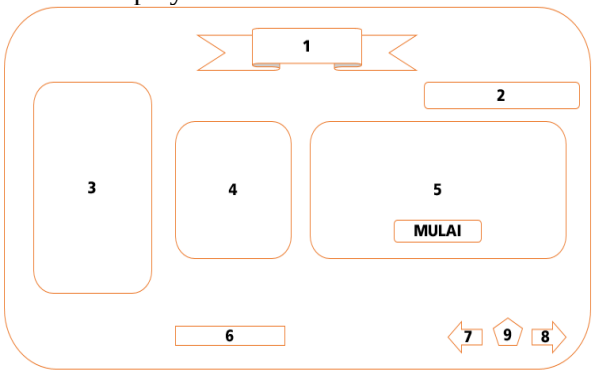
The format chosen in this development is in the form of interactive multimedia based on Lectora Inspire on chemical bonding materials prepared according to BSNP standards.

c. Initial Design

Collecting material from textbooks, pictures, sound effects, motion animations, animated videos, aesthetic supporting characters, backgrounds, competency test questions, answer keys, and game questions. Then the selection of the shape, background and background color of the media used for interactive multimedia based on Lectora Inspire. Parts of this learning media draft consists of main menu, material of chemical bonding, video animation, exercise, competence test, answer key and discussion, games, and profile author. All the compenent compile in Microsoft Word 2007.

Tabel 2 Intial Design of Media Display

Display Design	Information
Main Menu Display 	1. Material title "Ikatan Kimia" 2. Media hint menu 3. Competences menu 4. Material menu 5. Test competence menu 6. Games menu 7. Profile author menu 8. Study program and faculty
Media Instruction Display 	1. Material title "Ikatan Kimia" 2. Table of contents 3. Main screen 4. Sub menu button 5. Print button 6. Page button 7. Previous button 8. Next button 9. Home button

Display Design	Information
Material Display  	1. Material title "Ikatan Kimia" 2. Table of contents 3. Main screen 4. Sub menu button 5. Print button 6. Page button 7. Previous button 8. Next button 9. Home button 10. Subject matter
Test Competence Display  	1. Material title "Ikatan Kimia" 2. Table of contents 3. Test instruction and question screen 4. Sub menu button 5. Print button 6. Page button 7. Previous button 8. Next button 9. Home button 10. Start test button
Profile Author Display  	1. Photo of author 2. Identity of author 3. Home button
Games Display  	1. Material title "Ikatan Kimia" 2. Table of contents 3. Type of games 4. Games instruction 5. Games scree 6. Page button 7. Previous button 8. Next button 9. Home button

Development Stage

a. Interactive Multimedia Development

The following are compenents contained in Interactive Multimedia Based Lectora Inspire:

Tabel 3 Component of Interactive Multimedia Based Lectora Inspire

No.	Component	Decription
1.	Main Menu	Consists of media introduction, competence, material, competency test, games, and author profile.
2.	Media Instruction	Provides instructions for students to operate the media as a whole.
3.	Material	Each subject is equipped with an explanation of the material and pictures that can be a supporter in the explanation of each material.
4.	Competence Test	Consists of 10 multiple choice questions with a maximum score of 100 and will be declared to have passed the competency test if it gets a score of 75.
5.	Games	Consists of basketball games and bowling games.
6.	Author Profile	Provide information about the identity of the media maker.

The following are some display figure of Interactive Multimedia Based Lectora Inspire:

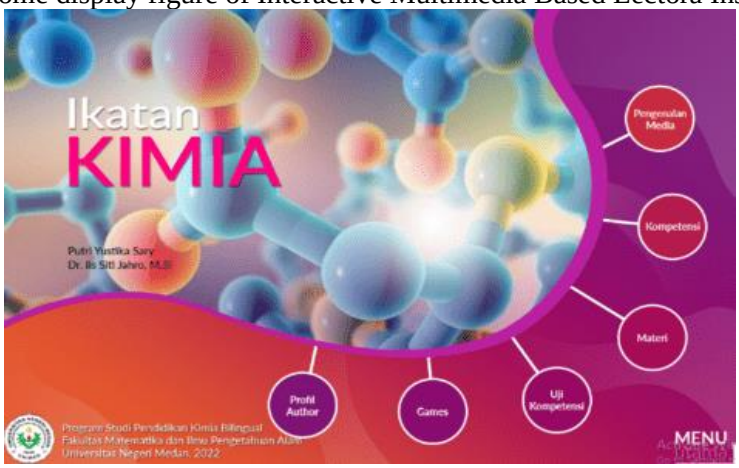


Figure 1 Main Menu Display

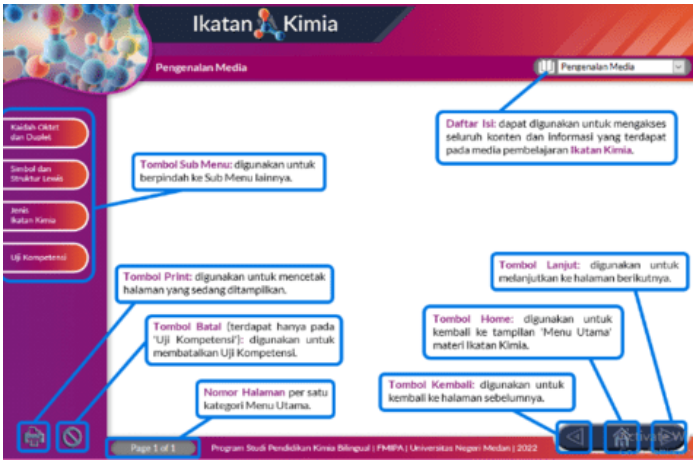


Figure 2 Media Instruction Display

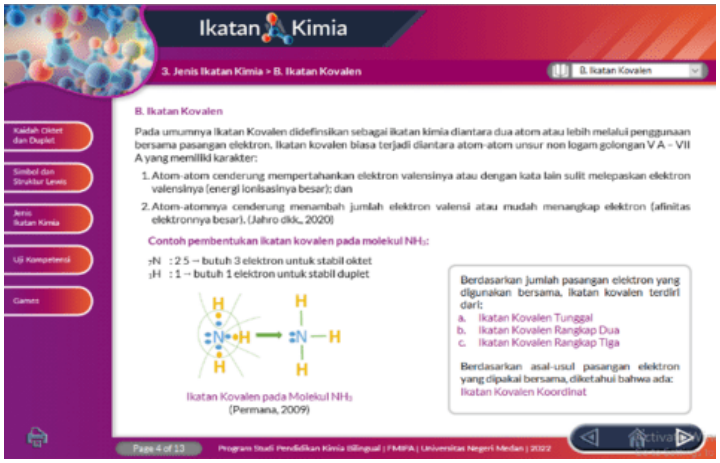


Figure 3 Material Display

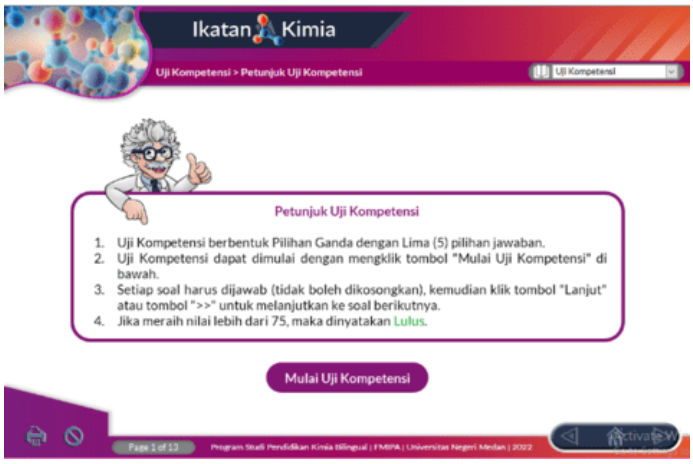


Figure 4 Competence Test Display

Figure 5 Games Display

Figure 6 Bibliography Display

b. Media Validation Result

Media validation was carried out to determine the feasibility of media being developed and to get suggestions for improvement. The media validation was carried out on 3 validators of which 1 lecturers and 2 teachers. The results of this stage are as follows:

Tabel 4 Media Validation Results by Lecturer 1

Aspects Assessed	Feasibility Percentage (%)	Category
Display Design	96	Very Feasible
Language	100	Very Feasible
Media Operation	90	Very Feasible

The first validators are chemistry lecturers in UNIMED who are expert in certain field. Based on the table result of validation, it shows that the media feasibility percentage of interactive multimedia based Lectora Inspire is categorized as very feasible with percentage in each aspect 96%, 100% and 90%.

Tabel 5 Media Validation Results by Teacher 1

Aspects Assessed	Feasibility Percentage (%)	Category
Display Design	98	Very Feasible
Language	80	Feasible
Media Operation	97	Very Feasible

The second validators are experienced chemistry teachers at MAN 3 Langkat. Based on the table result of validation, it shows that the media feasibility percentage of interactive multimedia based Lectora Inspire is categorized as very feasible with percentage in each aspect 98%, 80% and 97%.

Tabel 6 Media Validation Results by Teacher 2

Aspects Assessed	Feasibility Percentage (%)	Category
Display Design	100	Very Feasible
Language	100	Very Feasible
Media Operation	100	Very Feasible

The third validators are experienced chemistry teachers at MAN 3 Langkat. Based on the table result of validation, it shows that the media feasibility percentage of interactive multimedia based Lectora Inspire is categorized as very feasible with percentage in each aspect 100%, 100% and 100%.

The validation result of media feasibility for Interactive Multimedia Based Lectora Inspire for Grade X Senior High School based on the BSNP has three aspects, namely display design, word and language, and media operation. The percentage of media feasibility for each aspect based on the overall validators' assessment is above 90% where the average percentage of feasibility by

validator 1 is 95.33%, validator 2 is 91.7% and validator 3 is 100%, meaning that the quality of the product developed is categorized as "Very Feasible".

c. Material Validation Result

Material validation was carried out to determine the feasibility of material that contained in interactive multimedia based Lectora Inspire being developed and to get suggestions for improvement. The material validation was carried out on 3 validators of which 1 lecturers and 2 teachers. The results of this stage are as follows:

Tabel 7 Material Validation Results by Lecturer 1

Aspects Assessed	Feasibility Percentage (%)	Category
Content Feasibility	97	Very Feasible
Persentation Feasibility	94	Very Feasible
Language Feasibility	100	Very Feasible

The first validators are chemistry lecturers in UNIMED who are expert in certain field. Based on the table result of validation, it shows that the material feasibility percentage of interactive multimedia based Lectora Inspire is categorized as very feasible with percentage in each aspect 97%, 94% and 100%.

Tabel 8 Material Validation Results by Teacher 1

Aspects Assessed	Feasibility Percentage (%)	Category
Content Feasibility	97	Very Feasible
Persentation Feasibility	98	Very Feasible
Language Feasibility	96	Very Feasible

The second validators are experienced chemistry teachers at MAN 3 Langkat. Based on the table result of validation, it shows that the material feasibility percentage of interactive multimedia based Lectora Inspire is categorized as very feasible with percentage in each aspect 97%, 98% and 96%.

Tabel 9 Material Validation Results by Teacher 2

Aspects Assessed	Feasibility Percentage (%)	Category
Content Feasibility	97	Very Feasible
Persentation Feasibility	94	Very Feasible
Language Feasibility	96	Very Feasible

The third validators are experienced chemistry teachers at MAN 3 Langkat. Based on the table result of validation, it shows that the material feasibility percentage of interactive multimedia based Lectora Inspire is categorized as very feasible with percentage in each aspect 97%, 94% and 96%.

The validation result of material feasibility that contained in Interactive Multimedia Based Lectora Inspire for Grade X Senior High School based on the BSNP has three aspects, namely content feasibility, persentation feasibility, and language feasibility. The percentage of material feasibility for each aspect based on the overall validators' assessment is above 95% where the average percentage of feasibility by validator 1 is 97%, validator 2 is 97% and validator 3 is 95.7%, meaning that the quality of the product developed is categorized as "Very Feasible".

CONCLUSION

Interactive multimedia based on the Lectora Inspire on chemical bonding for grade X Senior High School has been successfully developed and obtained very high feasibility percentage for media and material, as well as a very high attractive percentage for students' response.

The feasibility of developing interactive multimedia based on the Lectora Inspire on chemical bonding materials based on BSNP criteria assessment categorized as "Very Feasible" with the results of media validation from 3 validators categorized as "Very Feasible" because the average percentage of validation results from 3 validators was above 90%, namely 95.33%; 91.7% and 100%. For the results of material validation from 3 validators categorized as "Very Feasible" too, because the average percentage of validation results from 3 validators was above 95%, namely 97%; 97% and 95.7%.

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