

Development of A Website-Based “Merdeka” Syntax in Improving Science Literacy Competencies

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DOI: <https://doi.org/10.51583/IJLTEMAS.2025.1407000040>

Received: 14 July 2025; Accepted: 19 July 2025; Published: 05 Aug 2025

Abstract: The researcher conducted research on the development of a website-based MERDEKA syntax on the learning process of students at SMPN 2 Kersamanah. This study aims to find out about: 1) how the ADDIE model with the MERDEKA syntax based on Websites can be applied to science subjects, 2) improving Science Literacy Competency (SLC) on the subject of the reproductive system of science subjects. The type of research used is Research and Development (R&D), and the research model uses ADDIE, namely Analysis, Design, Develop (Borg and Gall stages), Implementation, and Evaluate. The population in this study was 242 students in grade IX and a sample of 63 people. The data collection techniques used were non-test and test, the data obtained was analyzed by rating grade, and quantitative data was analyzed by linearity, normality, heteroscedasticity, and regression test. Product validation is carried out by 4 experts. Validated products are implemented on the research subjects. From the regression test, a linear equation $\hat{Y}=107.970-0.298X$ was produced, then the hypothesis was tested to see the significance of $t_{cal} = -1.315 > t_{table} = 1.296$ where H_0 was rejected and H_1 was accepted. This means that there is an influence of the website-based MERDEKA syntax on SLC. To see how much influence the X variable has, look at the R Square value of 0.028, meaning that the website-based MERDEKA syntax has an effect on the increase in SLC by 2.8%. So that the website-based MERDEKA syntax product is suitable for use and development in learning.

Keywords: MERDEKA Syntax, ADDIE, websites, science literacy, R&D

I. Introduction

Today's learning is often referred to as 21st century learning, this learning concept is a change in the learning approach from teacher-centered to student-centered. Students are required to have thinking and learning skills, including problem-solving skills, critical thinking, collaboration and communication skills. 21st century education experiences the addition of students' skills from the 4Cs (Critical Thinking and Problem Solving, Creativity and Innovation, Collaboration, and Communication) to the 6Cs, namely Character, Citizenship, Critical Thinking, Creativity, Collaboration, and Communication. In addition to students, teachers are also expected to have character in this learning.

The character of teachers as learners needs to be possessed to keep pace with education that develops according to the times. The characteristics of 21st century teachers include life-long learners, creative and innovative, optimizing technology, reflective, collaborative, applying student-centered, and applying a differentiated approach. (Ministry of Education and Culture, 2012).

The character of the learner can be implemented in various 21st century learning models, namely student centered, discovery learning, flipped classroom, project-based learning, collaborative learning, self-learning and blended learning.

In this learning, teachers must have character and are expected to equip students so that they are able to have a comprehensive or thorough understanding. To realize student learning in the 21st century, of course, there must be special and serious attention to literacy. In Febrianti (2022:112), science literacy is an understanding of science concepts, science process skills, and problem-solving skills. Science literacy can also assist students in understanding scientific information, developing critical thinking skills, and increasing their interest in science (Bunawan et al., 2021). In addition, science literacy can also affect students' learning achievement in science subjects, such as biology (Wang et al., 2023).

The learning that takes place is not just about transferring knowledge from teachers to students, but how the knowledge conveyed by teachers can be constructed properly by students. As reported by the Ministry of Education, Culture, Research and Technology (Kemdikbudristek) on December 5, 2023, the results of the Program for International Student Assessment (PISA) held in 2022 have not been able to boost Indonesia's position in the top 10 rankings. Indonesia is still far from Singapore which occupies the first position in Southeast Asia. The score for science is 398 which is only 2 points up from PISA Indonesia in 2018. This proves that the level of literacy, especially science literacy, is still low and there is a need for a solution to improve it. Furthermore, from the results of the National Assessment (AN) from year to year since it was held in 2021, it is still fluctuating, and this can be shown by the results of education report cards in schools whose scores are still decreasing a lot. This low literacy ability is none other than the learning efforts carried out in schools that are still not developed, especially in the subject of Natural Sciences (IPA).

This problem has become problematic at the national level, including at SMPN 2 Kersamanah. Apart from the AN result shown by the education report card, the results and learning process are still low, namely there are still many students who have not reached the score determined by the Minimum Completeness Criteria (MCC). This can be seen from the following table:

Table 1 Results of Mid-Semester School Assessment (PSTS) Science Subject Semester 1 Academic Year 2024/2025

No	Class	Value		Percentage (%)		Sum	
		>=75	<=75				
1	Class IX F	7	23	23	77	30	100 %
2	Class IX G	5	25	17	83	30	100 %
3	Class IX H	9	21	30	70	30	100 %
Average		7	67	23	77	30	100 %

Source: Science Teachers of Grade XIF, IXG, and IXH

Based on table 1.1, the completeness of students' learning in science learning only reaches 23% and 77% of students have not reached the MCC. Based on this, it can be interpreted that most students in the IXF-H class are not able to understand the concept of science and are still low in their literacy ability or competence.

The low competence of science literacy is supported by the results of previous peer observations, where the learning carried out still uses the direct learning model (one-way direct learning) and uses the classical method (lecture method), where the role of the teacher is the main source of learning and dominates the learning process. Furthermore, the researcher also conducted interviews with teachers of science subjects in grades IX-A and IX-B, and the results obtained by most students were minimal literacy or reading science textbooks, so that students were minimal to understand the concept of science. Furthermore, the researcher also collected data with student questionnaires on the learning media used, and as a result, students only used textbooks used by the two of them in the same bench.

The researcher also made observations on learning facilities, and obtained good supporting resources, where there is a representative computer laboratory room with adequate internet access. The researcher also gave a questionnaire to students regarding the ownership of mobile communication devices, and it turned out that most of the students had them. This is capital in implementing ICT-based learning. According to Ardiana (2023), Information and Communication Technology (ICT) has a very significant role in various aspects of life, including in the field of education. The application of ICT in elementary schools can provide various benefits, such as improving the quality of learning and developing students' digital skills.

Seeing the problems above, there needs to be a solution in improving literacy as a result of student learning, so that it can provide a stimulus for students to have good science literacy competencies. Models, methods, learning resources and learning media are important points in improving students' literacy competencies, so that 21st century learning can be achieved well. As explained by Lestari (2020), science literacy is very important to prepare the skills that students must have in the 21st century from elementary school to college levels which include critical, creative, collaborative and communication skills. Students' science literacy skills can be developed and improved with appropriate methods and supported by adequate technology. Furthermore, Rahadian in Febrianti (2022) explained that teachers need to realize quality learning and be able to learn students through the implementation of educational technology.

Regarding the development of education, educational technology has an important role in helping and facilitating the learning process to be more effective and efficient. According to Abdulhak and Darmawan (2017:111), it is explained that educational technology is an applied discipline, meaning that it develops because of the need in the field, namely the need to learn, learn effectively and efficiently, broader, faster, and so on. Furthermore, he stated that with educational technology, efficiency, effectiveness, and the quality of learning can be improved or improved.

To create and improve effective and efficient, active and fun learning, it is necessary to select suitable models, methods, learning resources and learning media. As explained by Wulandari et al. (2020) in Suryana, et al. (2022), The selection of learning methods and models is an alternative for the implementation of a fun learning and teaching process, one of the learning methods that can improve the learning process is the selection of learning media. Media cannot be separated from the learning process. The use of uninteresting and varied learning media makes students bored the use of media is very important for teachers to support the learning process because it can increase the attractiveness of students in learning so that the level of understanding can increase. The process of understanding a learning material can add to the achievement of students better.

Based on the explanation of the background and facts of the problems that arise above, the researcher wants to develop a syntax of MERDEKA learning with *websites* that can help students to improve literacy skills and improve student learning outcomes. The problems raised by the researcher are:

How is the analysis of the MERDEKA Syntax based on *websites* on the subject of the human reproductive system in science subjects?

How is the design of the MERDEKA Syntax based on websites on the subject of human reproductive systems in science subjects?

How is the development of the MERDEKA Syntax based *on websites* on the subject of human reproductive systems in science subjects?

How is the implementation of the website-based MERDEKA Syntax on the subject of human reproductive system science subjects?

How is the evaluation of the website-based MERDEKA Syntax on the subject of human reproductive system science subjects?

Can the MERDEKA Syntax based on *the websites* developed improve science literacy skills on the subject of the human reproductive system science subject in junior high school?

II. Reaserach Methodology

The method or type of research in this study is Research and Development (R&D), with the ADDIE model with development developed by Borg and Gall. The approach used by the researcher is a qualitative approach and a quantitative approach. The data collection technique is carried out non-test techniques, namely questionnaires and interviews, while the technical tests use objective tests.

Research design

The research design in the *Research and Development (R&D)* research of Borg and Gall that the researcher will carry out and develop is ADDIE developed by Branch (2009), the following are the stages of development of Borg and Gall. 1) Research and information collecting; 2) Planning; 3) Develop Preliminary of product; 4) Preliminary field testing; 5) Main product revision; 6) Main field test; 7) Operational product revision; 8) Operational field testing; 9) Final product revision; 10) Implementation; and 11) Dissemination. We can see the design of the research in the following image.

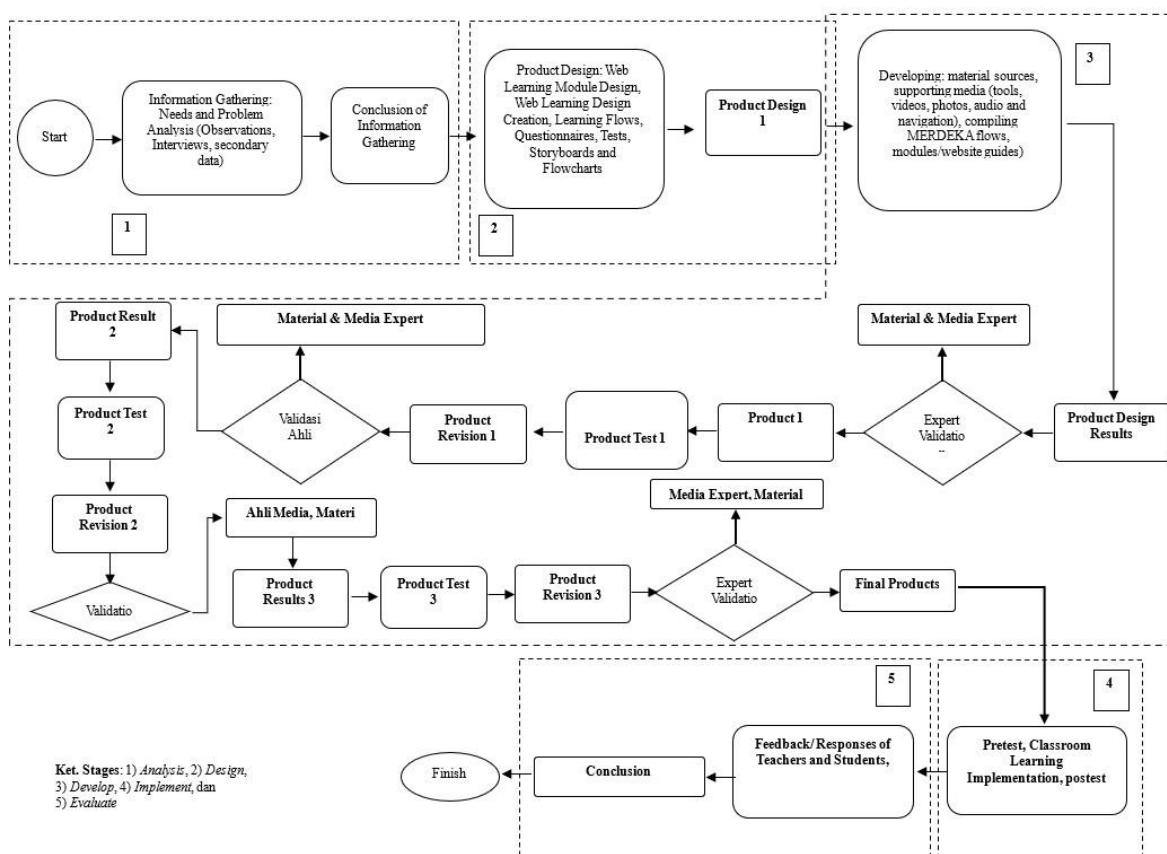


Figure 1 Research Design

Analysis

At the analysis stage, the analysis carried out is needs analysis (primary and secondary data) and information collection.

Design

At the design stage, it is carried out namely designing website learning modules, designing and creating websites.

Development

At the development stage, the results are producing the resulting product, design validation by expert validators, improving designs and materials, and testing products. To validate the initial product produced, media experts and material experts are tested so that the product produced is suitable for use, with the following criteria:

Table 2 Eligibility Percentage Criteria Table

Validation Value (%)	Category
87 – 100	Very Valid/ Very Good
70 – 86	Valid/ Good
53 – 69	Quite Valid/ Quite Good
37 – 52	Invalid/Not Good.
20 – 36	Invalid/ Not Good

Source: Modification Akbar & Noviani (2019)

The validation results obtained from the validators will be presented in the form of a table, and then analysed with the following formula.

$$\text{Validation Score (\%)} = \frac{f}{N} \times 100, \text{ where } f: \text{score obtained, and } N: \text{maximum score}$$

After the *expert judgment* stage, the next step for the researcher is to make improvements or revisions of some of the weaknesses obtained based on input from media experts and material experts.

Implementation

In the fourth stage, namely the implementation stage where the final product that has undergone validation and trial is used to carry out research in class IX-AB. There are three activities in this stage, namely pretest, learning and post-test activities.

Evaluation

At the evaluation stage, the researcher gave a questionnaire to students and teachers in an effort to see the extent of their response to learning with the MERDEKA syntax using websites.

Population and Sample

Population

According to Darmawan (2016:137), "population is a source of data in certain studies that has a large and extensive number, or a whole of elements or elements to be studied, as well as a group of people or objects that are used as objects of research". Based on this definition, students at SMPN 2 Kersamanah have certain characteristics and can be used as a population. So, the students of grade IX of SMPN 2 Kersamanah which totals 242 people can be used as a population.

Sample

According to Arikunto (2012), "if the population is less than 100 people, the sample number is taken as a whole, but if the population is larger than 100 people, then it can be taken 10-15% or 20-25% of the total population".

As formulated by Arikunto, the sample for this study is 25% x 242 people, which is about 60 people, but because in the study, namely classes IX-A and IX-B, the sample is 63 people.

Research Subject

In this study, there are several who are used as research subjects, namely expert validators, school principals, science teachers, and students.

Research Procedure

This model is used in this study because it has systematic stages. Each phase is evaluated and revised, so that the resulting product becomes a truly valid product. The ADDIE model is a product development concept, especially in learning products.

Table 3 ADDIE Model Procedure (Adapted from Branch, 2009)

Concept	Analysis	Design	Develop	Implement	Evaluate
	Identify the possible causes of gaps	Verify desired performance and appropriate testing methods	Generalize and validate learning resources	Setting up a learning environment and engaging learners	Assess product quality and learning processes before and after implementation
General Procedures	Validate performance gaps	Planning a website module	Validation of media and material experts	Perform a pretest	Students and teachers respond through questionnaires
	Define instructional goals	Creating website planning (flowchart, storyboard)	Product results revision	Teachers and students conduct web learning with MERDEKA syntax	Drawing conclusions
	Confirm your intended audience	Creating websites	Producing Revised Products	Perform a post-test	Revise
	Identify the resources needed		Conduct a test of a revised product		
	Determining a potential delivery system		Conducting instrument tests		
	Develop a project management plan		Perform statistical tests		
	Analysis Summary	Design Proofs	Learning Resources	Implementation Strategy	Evaluation Plan

Data Analysis

Qualitative data analysis uses qualitative description, while quantitative analysis uses validity test, reliability test, normality test, linearity test, homogeneity test and linear regression test (SPSS version 27).

III. Result and Discussion

Table 4 Details of Website-based MERDEKA syntax development

No	Development Procedure	Rincian
1	<i>Analysis</i>	Primary Data Analysis Analysis of teacher characteristics Analysis of the characteristics of students with learning problems Analysis of the school's environment and facilities Analysis of learning resource needs Analysis of peers and media experts. Secondary Data Analysis Curriculum analysis Analysis of learners' learning outcomes
2	<i>Design</i>	Data collection Make a plan Selecting and Assigning <i>Software</i> Module planning <i>Flowchart</i> <i>Storyboard</i>

No	Development Procedure	Rincian
3	<i>Develop</i>	At this stage, the stages contained in the development of Borg and Gall are carried out. <i>Research and Information Collecting</i> <i>Planning</i> <i>Develop Preliminary of Product</i> <i>Preliminary Field Testing</i> <i>Main Product Revision</i> <i>Main Field Test</i> <i>Operational Product Revision</i> <i>Operational Field Testing</i> <i>Final Product Revision</i> <i>Final Product Implementation</i> <i>Dissemination</i>
4	<i>Implementation</i>	Carry out learning in which there is a <i>pretest</i> , learning with the product produced and <i>post-test</i>
5	<i>Evaluate</i>	Distributing questionnaires for Teacher and Student responses Conclusion

Source: Researcher Analysis

Analisis

Teachers as educators in learning must have the ability to not only focus on good and exemplary as well as the transfer of academic knowledge to students, but teachers must also have character to be able to create fun learning. Teachers are required to be active, creative, innovative and skilled to be good facilitators as drivers of learning change in schools.

The results of the interview with science teachers in grade IX of SMPN 2 Kersamanah Garut Regency regarding the characteristics that teachers must possess are as follows:

Table 5 Teacher Interviews

No	Teacher's Name	Interview Results
1	Nenden Lasminingsih, S.Ag, S.Pd.	According to the teacher, learning now must be adjusted to the development of the times, learning must be adjusted to the character of current students. The rapid development of technology affects the order of human life, including the learning that occurs in schools. Science learning is very full of abilities possessed by the students themselves considering that science material is very complex, not only memorization, practice, and of course science literacy. It is therefore very important that learning is now associated with a technology, so that the learning becomes fun, more interesting and more challenging. However, as a teacher, I am not proficient enough in creating technology-based learning media such as <i>websites</i>, let alone the time needed to compile and create learning resources is quite long. So that in carrying out learning in the classroom, I am more one-way and occasionally use infocus tools. In my opinion, learning with varied learning resources will provide broad knowledge and interesting learning media will provide the learning experience that students want, namely changes in their learning.

Observation and interview of teachers. Based on the results of observations in the classroom, teachers do more one-way learning even though they use projectors, which means that teachers only share knowledge or teaching materials and projectors are only

used as a medium for displaying materials, while students in their learning use books as a learning resource. Media is not only a tool for teachers in teaching, but more than that, learning media is a bridge to provide knowledge from knowledge givers (teachers) to knowledge recipients (students) (Okra & Novera, 2019). Thus, more varied, effective and interactive learning resources and media are needed. According to (Richard E. Mayer, 2020), digital media in learning allows the integration of text, audio, video, and other interactive elements, so that it is able to provide a more interesting and more effective learning experience for students. So that learning is not *teacher-centered*, namely teacher-centered learning, but learning must be *student-centered*. The characteristics of 21st century teachers include *life-long learners*, creative and innovative, optimizing technology, reflective, collaborative, applying *student-centered*, and applying a differentiated approach. (Ministry of Education and Culture). Furthermore, based on interviews with teachers, it was found that learning must be adapted to the development of the times which is integrated with technology. According to Prof. Dr. Imam Suprayogo, the times are always changing, so education should be carried out in accordance with the demands of the change. Education that is not adapted to the changing times, then the results will be left behind. Its graduates will not be able to adapt to the ever-changing times. Then the researcher provides a questionnaire to see the extent of the need for the development of learning media in the teaching and learning process. From the results of the questionnaire, 62.5% of teachers agreed (S) with learning media that is effective, efficient, interesting and fun in accordance with the development of the times and the character of students. Therefore, the researcher concludes that there is a need for Technology, Information and Communication (ICT)-based learning media, namely with a website-based MERDEKA syntax, so that learning media is no longer conventional.

Table 6 Results of Observation of Student Characteristics

No	Description	Observation results that are in accordance with the theory	Results of observations in the field
1	Have a concrete operational mindset	Average learners in the level of thinking of concrete operational stages that require concrete things in learning (real)	Just like theory, students prefer concrete and real things, but due to the lack of learning resources or media and learning models that include concrete things, most children are only biased to be fixated on the teacher's explanation.
2	Enjoys learning in groups and exchanging ideas	In working the student group is quite active and they chat with each other and express their opinions.	Students prefer to work together but still have to be directed because if they are allowed to gather, they will just play and not learn
3	Fun to play	Students are very happy if they are invited to play in learning. This fosters a spirit of learning for students	Just like the theory, students love to play, they prefer to learn that is like playing. In learning, teachers have not applied the concept of learning while playing
4	Have curiosity	Students will ask about things they have just seen, especially in the form of pictures, or other forms that they feel are new and strange and interesting to know	Here it can be seen that the students' curiosity is higher when the teacher shows new things in learning at that time the teacher brought a book with pictures of reproduction to humans. Children are immediately curious

Source: Class Observation on April 8, 2025

Observation and interview of students. Based on the researcher's observations during classroom observation of students (table 6), it was found that when the teacher displayed the image on the projector, the students' response was quite fast, more focused and responded well. Furthermore, the researcher also saw that students were more conversing with their friends than paying attention to the teacher who was delivering the material. Hiltz (in Setyosari, 2009) who revealed that *learner-centered* learning is not *teacher-centered* and knowledge is seen as a *social construct*, which can be done through peer interaction), assessing learning and cooperation activities. Based on the findings of observations on students, the researcher concluded that there needs to be a collaborative learning process, requiring varied, effective, and efficient media/models to achieve learning goals. Therefore, the researcher is interested in developing learning media that can accommodate these problems by developing a website-based MERDEKA syntax media *with* the hope that students will cooperate with each other in constructing knowledge.

Based on the findings of the observations above, the researcher concluded that there needs to be a collaborative learning process, more varied learning media and models than just displaying pictures. Therefore, the researcher is interested in developing media and learning models with learning steps that can accommodate the learning activities of students that are carried out, and can display something concrete and raise students' high curiosity about the material being taught. Therefore, the researcher develops a media and website learning model in which there are learning steps, namely the MERDEKA syntax.

Table 7 Infrastructure and Facilities of SMPN 2 Kersamanah

No	Facilities	Quantity and Conditions
1	Lab. Computer	2 rooms in good condition
2	Personal Computer	35-units in good condition
3	Laptop Ownership of each teacher	Good and adequate condition
4	Power Source	Good/ adequate
5	<i>LCD Projector</i>	4-units in good condition
6	Internet 100Mbps	Good

Source: SMPN 2 Kersamanah Assets 2025

School facilities and environment. Based on the results of the researcher's observation on the state of the facilities and school environment owned by SMPN 2 Kersamanah (table 7), the researcher concluded that with the availability of adequate facilities and infrastructure, the development of learning media with a website-based MERDEKA syntax is feasible to be developed. A conducive environment has a great influence on the implementation of effective learning, if the school environment is not supportive, learning at school will not be can run effectively supported by adequate facilities and infrastructure and effective use of learning media. (Natalya Hutabarat, 2022)

Table 8 Student Interviews

Yes	Teacher's Name	Interview Results
1	Student 1	According to Student 2, the use of technology as a learning resource is needed so that the material studied is wider. In the material of the reproductive system in particular, we as students must understand it very well through text, pictures and videos.
2	Student 2	According to Student 2, the existence of learning resources such as interactive multimedia will make students happy because the presentation of the material is more varied.
3	Student 3	According to Student 3, with many learning resources, we as students will understand the material better because our literacy is increasing.
4	Student 4	According to Student 4, the learning that occurs in the classroom is only books and teachers as learning resources, and the teaching method is also always the teacher always tells stories.
5	Student 5	According to Student 5, the use of libraries is not maximized so that the literacy of students is low.

Source: Student Interview on April 8, 2025

Learning resources. According to the Law of the Republic of Indonesia No. 20 of 2003 Chapter I Article 1 Paragraph 20, many factors interact with each other in the learning process, including teachers, students, and learning resources. Based on the results of interviews (table 8) conducted with a number of grade IX students at SMPN 2 Kersamanah, it was found that the development of a website-based MERDEKA syntax needs to be developed and used as a learning resource that students expect. Widyastuti et al. (2014) prove that web educative (web in learning) is an alternative learning resource that has been proven to be effective and efficient. According to Hadjerrouit (2010), learning by utilizing the web has the potential to support the learning environment of students.

Table 9 Curriculum Distribution for Each Level

Yes	Class	Curriculum
1	Class VII	Independent Curriculum
2	Class VIII	Independent Curriculum
3	Class IX	Curriculum 2013

Source: Document I SMPN 2 Kersamanah

Curriculum. Based on the documents that the researcher read, namely document I (curriculum, syllabus) for grade IX for the 2024/2025 school year is still using the 2013 curriculum, and in the 2025/2026 school year must have used the Merdeka curriculum. Regulation of the Minister of Education and Culture Number 12 of 2024 contains the implementation of the Independent Curriculum as a curriculum that applies to early childhood education, primary education, and secondary education. Based on the regulation, educational units that have not implemented the Independent Curriculum are still allowed to use the 2013 Curriculum until the 2025/2026 school year. The Merdeka Curriculum must start in the 2026/2027 school year at the latest. In the Merdeka curriculum, teachers are the facilitators of learning and students are the subjects of learning. Therefore, the researcher considers it very important and feasible for the website-based MERDEKA syntax to be developed in the next curriculum, namely the independent curriculum.

Learning Outcomes. Based on the data obtained by the researcher (table 4.10), the results of the Mid-Semester School Assessment (PSTS) in science subjects received an average score of at most below 75. And based on the results of the National Assessment (AN), students in 2023 and 2024 experienced a decrease of 18.04 in literacy skills. Therefore, the researcher is interested in developing a website-based MERDEKA syntax learning media/model in improving science literacy competencies.

Desain

The design stage is the second stage of the ADDIE model, which is used to design websites-based MERDEKA syntax learning media. Product planning is carried out in several steps, namely:

Data Collection

At this stage, the researcher collects information or data that can support the creation of products in the research such as the Learning Implementation Plan (RPP), the science syllabus for class IX with material on the reproductive system in humans, as well as books and sources of supporting material in this research.

Important information or data needs to be compiled to support the creation of product design, starting from analyzing the science syllabus for class IX (attached), making a Learning Implementation Plan (RPP), finding and collecting teaching materials from package books or other source books that are supportive and relevant, namely from libraries and the internet. Learning resources can come from books, scientific journals, the internet, magazines, newspapers, television, and so on. The development of Internet network technology has changed the paradigm of obtaining information and communicating, which is no longer limited by the dimensions of space and time. Through the existence of the internet, they can get the information they need anywhere and anytime they want (Adri, 2007). The benefits of the internet for education include access to information sources, access to experts, and collaborative media (Rahardjo, 2001).

The lesson plan is compiled into two meetings, namely the first meeting (offline) starting from the syntax of Starting from Self (M) and the syntax of Exploration (E) for 2 hours of lessons, and the second meeting of 3 hours of lessons (online) starting from the syntax of the Collaboration Room (R), the syntax of Contextual Demonstration (D), the syntax of Elaboration (E), the syntax of Connections Between Materials (K) and the syntax of Real Action (A). The first meeting was held at school, namely in the computer laboratory and the second meeting was held at each other's homes and adjusted to their respective groups. This online learning is carried out with several considerations, namely 1) learning is not only fixed at school but can also be carried out outside of school, 2) allows for a customized or flexible learning experience, 3) avoids the use of laboratory space at the same time, 4) provides new learning experiences so that learning is more meaningful, 5) provides an independent learning experience, and 6) uses gadgets as learning media.

Making a Plan

Furthermore, the researcher compiles product design starting from selecting and setting software in creating website designs, designing modules, creating flowcharts, creating storyboards, and creating MERDEKA syntax learning flows.

Product design is designed using *software* from *Google*, namely *Google Sites*. This *software* is used by researchers because it is simple, easy to use and free (free). As well as other applications that can be integrated with *this google sites software*, such as *google forms* for attendance lists, quizzes, feedback and evaluations, and [authpro](#) for login.

Creating a Learning Flow

The learning flow that is carried out is inseparable from the website-based MERDEKA syntax that has been described in figure 2 and in the learning plan. This makes it a guideline in carrying out learning that will be carried out by teachers and students.

Creating a Storyboard

Storyboard is a benchmark in developing the media/learning model that is created, namely the website-based MERDEKA syntax which will later be used in learning (table 10).

Creating a Flowchart

The workflow of the learning media/model with the website-based MERDEKA syntax is illustrated in the *flowchart* (figure 11) to be clearly visible.

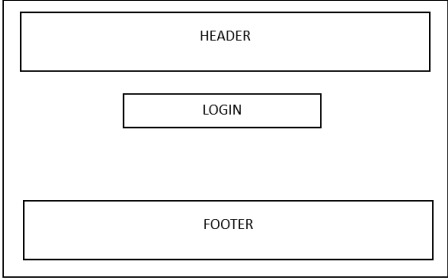
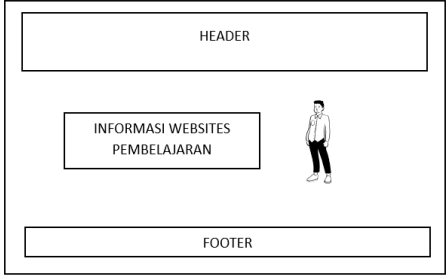
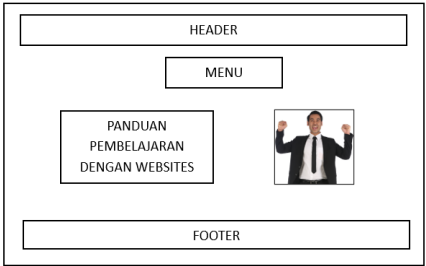
Creating a Instrument

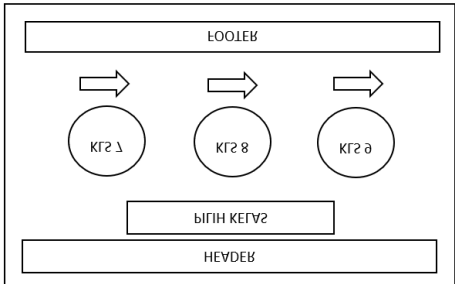
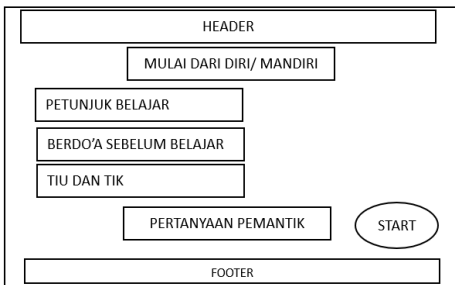
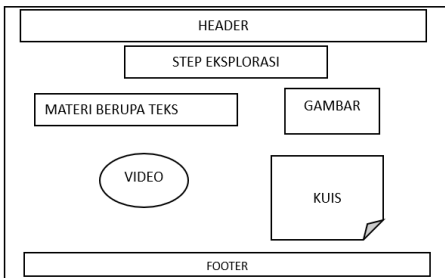
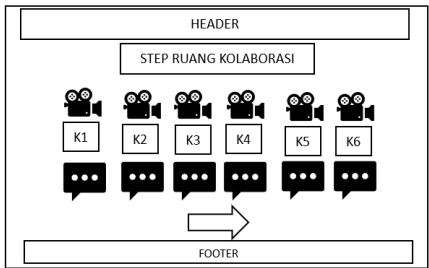
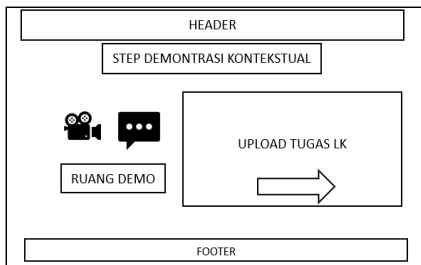
According to Utari (2016) in Ayu (2022) states that a test is an instrument to collect data about the ability of research subjects by means of measurement. Furthermore, Hermawan (2007) stated that test is a method of collecting data using a measuring instrument.

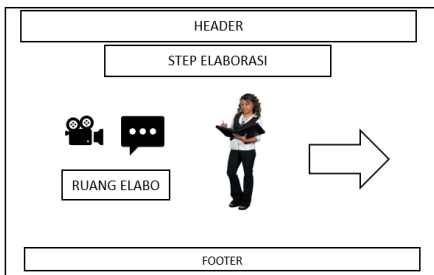
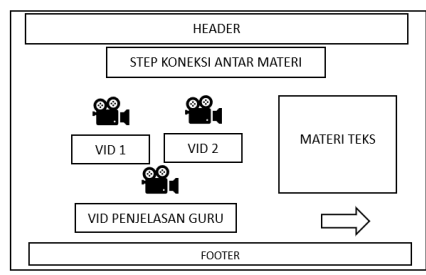
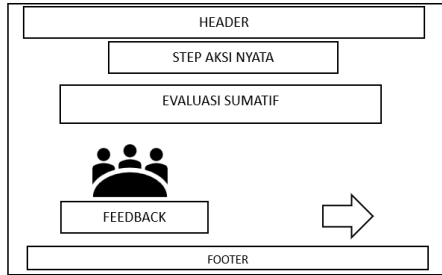
The instrument is a measuring tool used in the research to measure whether the MERDEKA syntax is effective in learning and measure the improvement of science literacy competencies possessed by students. The instruments used in this study are tests and questionnaires. There are two tests used in this study, namely the pretest and the final evaluation test (post-test). The test is used to determine the abilities of the research subject. In this study, the test used is an objective test in the form of multiple choice which contains questions to measure students' science literacy competencies in the competency dimension, content dimension, attitude dimension and context dimension, in this study it is limited to measuring the content dimension. The tests used were pretest and post-test with the same questions as many as 20 questions.

Meanwhile, the questionnaire was made on a Likert scale with 18 questions to measure the effectiveness of the MERDEKA syntax during learning. Tests and questionnaires are embedded in websites in the form of buttons on certain pages that are integrated with Google Forms.

Table 10 Overview of *Learning Media Storyboard* with Website-based MERDEKA system

No	Visual	Information
1		The first frame (page) of <i>websites</i> is the Header display, login button and Footer. The name of the website used in the header is "GO SAINS" Click the login button to start learning, namely by filling out the student attendance on the google form Click the link on the attendance resume to the second page.
2		The second page is an information page about learning using the website-based MERDEKA syntax. Click the next button to go to the third page, which is the menu page
3		The third page is a menu information page, namely a guide menu for the use of learning <i>websites</i> and a teacher profile menu. After reading the user guide, then click the "next" button to go to the fourth page, which is the learning page.

No	Visual	Information
4		The fourth page is the level selection page, namely grade 7, grade 8 and grade 9. After choosing a class, the page that opens is the 9th grade learning page by displaying some materials for each meeting. Click on the image of the nth meeting, so that it connects to the fifth page which is to start learning
5		On the fifth page is the first MERDEKA syntax page, namely Starting from oneself, which contains learning instructions, praying before learning, as well as KI and KD or General Instructional Goals (TIU) and Special Instructional Goals (ICT). Furthermore, students are asked to answer the lighter questions provided in the form of comments to answer them. Below it is a "start" button to start and proceed to the next stage.
6		On the sixth page, namely the Exploration syntax, teaching materials in the form of texts, images and videos connected to YouTube are displayed. On this page, quizzes or formative assessments are also displayed to measure the mastery of the material that has been learned by students with the <i>flue form quiz application</i>. At the end of the question, a command will appear to proceed to the next page, which is the syntax of the Collaboration Room.
7		On the Collaboration Space page, learning instructions are displayed to join the zoom link of each group or chat room for each group and worksheets that must be done (LK). After doing the LK assignment, students are instructed to enter the main Collaboration Room to join the subject teacher. Next, click the Next button to go to the Demo syntax page.
8		On the Demonstration page, students join the chat box, zoom or appear in class to convey the results of their assignments. Furthermore, students also upload their work, by pressing the collect assignment button. Then at the end of the collection of assignments, it will be directed to proceed to the Elaboration stage to strengthen the material.

No	Visual	Information
9		On the Elaboration page, students enter the chat box or zoom that has been provided and students listen to the reinforcement of the material from the subject teacher. After the elaboration is completed, students are asked to proceed to the next step, namely the syntax of connections between materials.
10		On this page, several videos and materials are displayed in understanding the relationship between the material that has been studied in the previous class and the material that has just been learned. Summary Material
11		Next, click to go to the Real Action syntax, where on the page is displayed a button for evaluation to measure the understanding of the material that has been learned. As well as being given a button to access feedback on learning that has taken place Reference

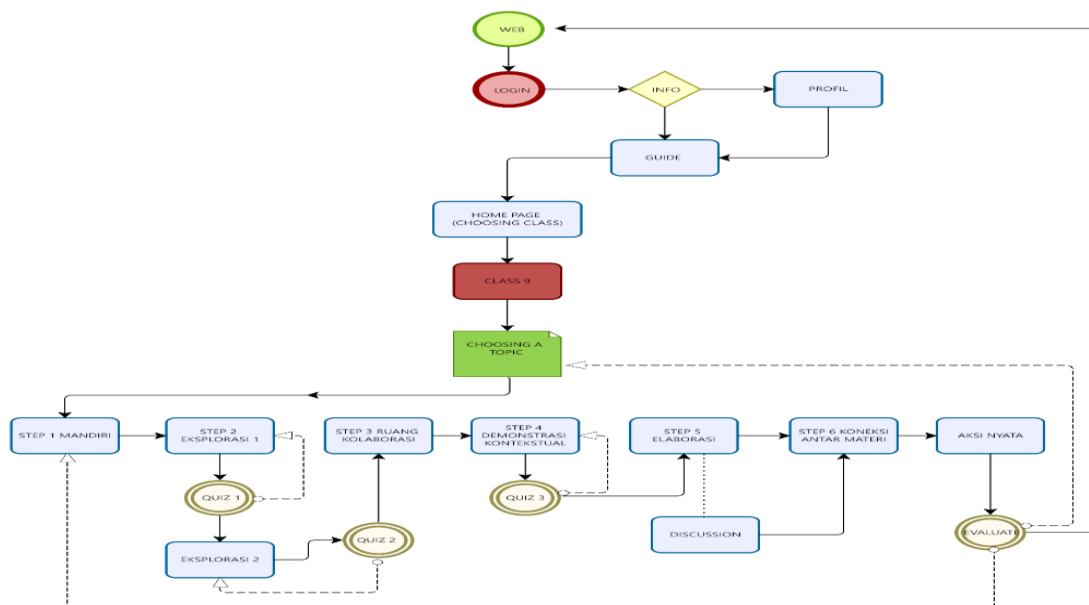


Figure 2 Learning Flowchart with MERDEKA Syntax Website-based

Pengembangan

The development stage refers to the development steps developed by Borg and Gall. There are 11 stages that need to be passed in the development of websites-based MERDEKA syntax media / models in achieving the expected goal, which is to improve students' science literacy competencies on the subject of human reproductive systems science subjects in grade IX of junior high school. The stages of development are 1) collection of information or data, 2) planning, 3) product design development, 4) small/limited scale product trials, 5) initial product revisions, 6) extensive trials, 7) large-scale product revisions, 8) large-scale product trials, 9) final/final revisions, 10) final product implementation, and 11) dissemination of final products that have been tested and used in implementation.

In the first stage of development, emphasis was placed on several needs analyses that were previously carried out by ADDIE. The emphasis at this stage is that the products developed are a very important part of education, especially in learning. Based on observations and interviews that have been carried out, that effective, active, varied, interesting, interactive and fun learning is the aspiration that is aspired to in learning. The website-based MERDEKA syntax product offers as a media/model that can catalyze the desired learning expectations, especially those to be researched, namely being able to improve students' science literacy competencies. Literature studies and literature studies provide an idea that google sites learning media has an influence on student learning outcomes. Khuryati and Purwanti (2024) in their research explained that google sites media is effectively used with an average post-test value (93.42%) which is much greater than the pretest average of 80.74%. In addition, a small study conducted by researchers on 6 students gave a positive response, where learning with websites was very interesting and fun. There are several advantages where researchers use google sites as a learning web application, as explained by Lugiyan (2022:96) that google sites provide very easy access because they are connected to other google tools for free. The advantage of google sites is that it can be designed with many pages and interactive buttons so that it is possible to convert it into an android application (Afifah et al., 2021:12-16). Google sites can make it easier for students to access information in learning. The ease of accessing information means that google sites-based learning media can be developed more practically than other learning media (Japrizal, 2021:85). Quoting from Rosiyana (2021:55), learning using google sites provides benefits for students and teachers. The benefits or advantages of google sites are as follows: 1) google sites can make students more interesting and fun; 2) Google Sites can provide downloadable learning materials so that students can learn from the materials anywhere and anytime; 3) Google Sites can provide material that from the beginning to the end of the meeting, students can reread the material given by the teacher because the material is not automatically lost.

In the second stage, the researcher makes more careful planning for a product design to become a product that will be carried out in learning. In developing this product, the researcher independently spent funds for 1 month of research starting from March 10, 2025 to April 10, 2025. Researchers in their research will also be assisted by other parties such as teachers and educators. Teachers are the facilitators in learning while students are the subjects of learning. Teachers and students are given a module on the use of

The third stage is the stage where the researcher determines the research facilities, the facilities used by the researcher are laptops with the 12th processor specifications of Intel Celeron i5-12500H, 8GB of RAM, Windows 11, and SSD-512GB and at least 5GB of internet. This means are seen as more than enough to create a temporary design of a product to be developed. The initial product of the website was then validated by expert validators, namely Dr. Iman Nasrulloh, M.Pd (Lecturer of S2 Educational Technology as well as Head of the PTI Study Program at IPI Garut) as Expert Validator I of Media, Didin Pahrudin, S.Pd., M.Pd (Principal of Educational Technology graduate) as expert validator II of Media, Dr. Risa R. Sunarya, S.Pd., M.Pkim (Lecturer of Chemistry Education and Head of the Department of Chemistry Education UIN Bandung) as expert validator I of the material and Puspa Medalia Munggarani, S.Pd.Gr. (Science Teacher and Driving Teacher of SMPN 2 Kersamanah) as validator II material expert. They are all more than enough to be seen as expert validators because they fit their respective fields.

Before the expert validator test, the initial product was tested first on 3 colleagues and 7 students on campus to see and determine the feasibility of the product that had been made. From the results of the friend's feasibility test, a percentage value of 66% was obtained, meaning that the media is quite feasible for use by users.

The fourth stage is the limited product test stage. However, before this limited test is carried out, expert validators first validate based on their respective expertise. Based on the results of the feasibility test of media expert validators, the media validator assessment I was 80% and the media validator II assessment was 85%, and based on the criteria of the percentage of media feasibility is in the valid/good category, meaning that the media is considered suitable for use. Furthermore, based on the results of the material validator assessment, the assessment of the validator of material I was 85% and the assessment of the validator of material II was 82.5%, this indicates that the assessment of the material of the two validators is on the criteria of valid/good, meaning that the material contained in the website-based MERDEKA syntax media, namely the subject matter of human reproduction, is declared worthy of being given in the learning process.

The assessment from media expert validators on the MERDEKA syntax learning media based on websites as a whole resulted in an average assessment of $4.1 = 82\%$ out of a maximum of 5.0 with a good/valid category. Based on the general aspect, the average score reached $4.15 = 83\%$ with the good/valid category. It can be interpreted that the MERDEKA syntax learning media based on websites is developed to be innovative, creative, interactive and communicative. This indicates that the MERDEKA syntax learning media based on websites has advantages compared to conventional learning media.

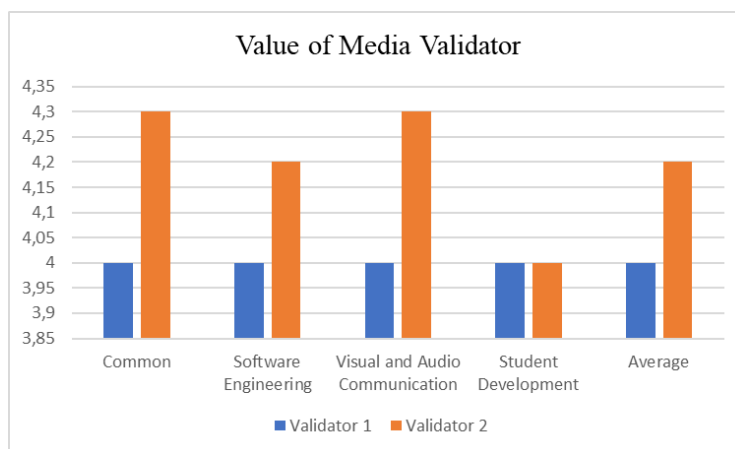


Figure 3 Media Validator Assessment Results Graph

Meanwhile, judging from the aspect of software engineering, the average score reached $4.1 = 82\%$ with the good/valid category. It can be interpreted that the MERDEKA syntax learning media developed meets the requirements, namely reliability, can be managed and maintained easily/maintainable, easy to use and simple in its operation/usability, is correct in software selection, can be used on various devices/compatibility and has good effectiveness.

The communication and visual aspects have creative, unity, communicative, reflective object images, appropriate colour selection, excellent typography, good layout, simple navigation, and relevant audio elements. The researcher looked at this aspect of the validator giving an assessment with an average score of $4.15 = 83\%$ with the good/valid category. It can be interpreted that this aspect supports the MERDEKA syntax learning media based on websites.

The last aspect that the researcher saw was the development of students, where the assessment of expert validators gave an average score of 4.0 with a good/valid category. It can be interpreted that the MERDEKA syntax learning media is based on websites that are developed in accordance with the cognitive development and psychological development of students.

The researcher saw that the assessment of media expert validators by giving an average rating of each aspect 4 out of a maximal average of 5, meant that there were several records that needed to be corrected by the developers of the resulting product. The records of expert validators can be seen in the following table:

Table 11 Media *Validator* Notes

No	Validator	Media Expert Validator Notes
1	Validator I	The description of the web as a learning medium please be explained more clearly as its intended The emphasis on students to read the instructions for use first is emphasized on the first page Text should contain <i>hypertext</i> not just limited to images
2	Validator II	Stages/order of use should be displayed without scrolling or presented on a single page There are pictures without any naming. It is recommended that the name of the image be captioned Learning objectives should not include ABCD elements. ABCD description is for designers/developers only. In order not to raise questions for students

Source: Validator Assessment Results

Table 12 Media Expert *Validator* Results Recap

No	Media Validation Components	Validator									
		I					II				
		1	2	3	4	5	1	2	3	4	5
1	General Aspects	-	-	-	3	-	-	-	1	-	2

No	Media Validation Components	Validator									
		I					II				
		1	2	3	4	5	1	2	3	4	5
2	Aspects of Software Engineering	-	-	-	6	-	-	-	-	5	1
3	Visual and Audio Communication Aspects	-	-	-	9	-	-	-	-	6	3
4	Aspects of Student Development	-	-	-	2	-	-	-	-	2	-
Sum					20				1	13	6
Total		80					85				

Source: Media *Expert* Validator Assessment

Based on the conversion table above, the percentage obtained from the test results of learning media experts is 80% and 85% which are in the range of 70 – 86.

Table 13 Recap of the Results of the Material *Expert* Validator

No	Material Validation Components	Validator									
		I					II				
		1	2	3	4	5	1	2	3	4	5
1	Content Eligibility	-	-	-	7	2	-	-	-	9	-
2	Readability of Writing	-	-	-	3	1	-	-	-	3	1
3	Presentation Eligibility	-	-	-	2	1	-	-	-	2	1
Sum					12	4				14	2
Total		68					66				

Source: Material *Expert* Validator Assessment

Based on the conversion table above, the percentages obtained from the test results of learning material experts are 85% and 82.5% which are in the range of 70 – 86.

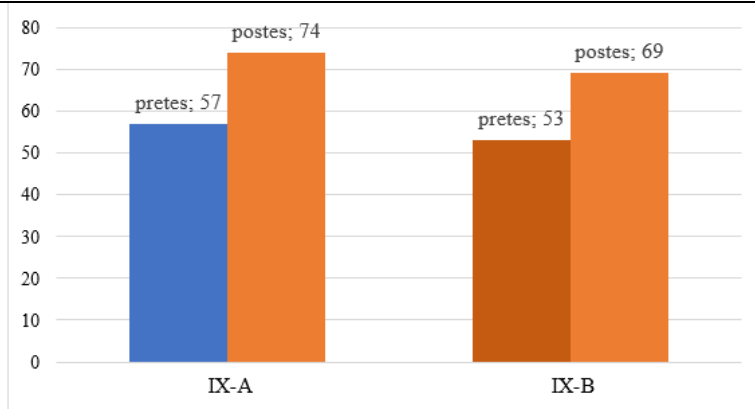
Implementation

The MERDEKA website-based syntax learning media that has been designed and developed certainly needs to be implemented to answer the problems contained in learning and answer the objectives of the following stages.

- Guiding students to achieve the goal, which is to improve science literacy with website-based MERDEKA syntax learning media on the subject of human reproduction science subjects;
- Providing problem-solving solutions to overcome student gaps; and
- Producing outputs is having mastery of science literacy competencies.

In this implementation stage, there are stages that are applied, starting from arranging research schedules, preparing instruments, preparing modules/guides, preparing research subjects, to preparing infrastructure, carrying out research, and processing research results. Research in this implementation stage is carried out in accordance with the set time frame.

On the first day of research, achievement data was obtained from the two classes and for the second day, final evaluation data (*post-test*) and questionnaire data were obtained. The three data will then be processed and used as a basis to answer the problems that have been determined previously, namely to see the influence of website-based MERDEKA syntax learning media on improving science literacy on the subject of human reproduction science subjects in grade IX of SMPN 2 Kersamanah. The following data were obtained from research in classes IX-A and IX-B. Science literacy in question is in the content dimension.



Source: Pretest and Post-test Scores for Classes IX-A and IX-B

Figure 4 Average Pretest-post-test Scores of Classes IX-A and IX-B

From the results of the average pretest and post-test scores of these two classes, where the pretest score for class IX-A is 57 and the post-test is 74, while the average score of the pretest class IX-B is 53 and the post-test is 69. This data can be used as an initial conclusion with the interpretation of the data where both classes IX-A and IX-B have increased values based on the MERDEKA syntax based on websites. The average score of the IX-A and IX-B pretest and post-test has increased, in accordance with the initial assumption that the learning process by following the website-based MERDEKA syntax will increase students' science literacy on the subject of the human reproductive system in the subject of Natural Sciences (IPA).

To see whether learning media with a website-based MERDEKA syntax has an effect on improving science literacy competence, it is necessary to recapitulation of questionnaire data and pretest-post-test data.

Table 14 Recap of Post-test Scores and Questionnaire Scores for Classes IX-A and IX-B

No.	No. Learners	Total Score		
		<i>Pretest</i>	<i>Post-test</i>	Questionnaire
1	1	45	70	84
2	2	55	75	96
3	3	65	80	93
4	4	80	80	79
5	5	40	85	88
6	6	75	80	76
7	7	70	80	76
8	8	65	75	79
9	9	45	70	94
10	10	60	80	87
11	11	55	85	81
12	12	70	80	87
13	13	35	90	77
14	14	45	75	79
15	15	70	70	80
16	16	35	85	88
17	17	55	80	82
18	18	65	75	88

No.	No. Learners	Total Score		
		<i>Pretest</i>	<i>Post-test</i>	Questionnaire
19	19	60	70	91
20	20	60	80	84
21	21	60	80	84
22	22	50	75	88
23	23	55	75	83
24	24	75	85	82
25	25	25	75	78
26	26	45	75	83
27	27	60	70	82
28	28	50	70	84
29	29	45	75	74
30	30	70	80	76
31	31	75	85	83
32	32	80	70	72
33	33	80	80	77
34	34	85	85	87
35	35	80	75	84
36	36	80	75	84
37	37	75	70	79
38	38	70	60	78
39	39	80	70	84
40	40	85	70	80
41	41	80	60	74
42	42	90	75	88
43	43	75	75	88
44	44	70	70	87
45	45	85	60	84
46	46	80	65	86
47	47	75	65	81
48	48	70	70	80
49	49	80	55	90
50	50	80	60	83
51	51	75	50	81
52	52	75	75	81
53	53	85	85	78
54	54	75	80	72

No.	No. Learners	Total Score		
		<i>Pretest</i>	<i>Post-test</i>	Questionnaire
55	55	75	80	86
56	56	70	55	82
57	57	70	75	78
58	58	75	60	77
59	59	80	65	87
60	60	85	60	89
61	61	70	70	81
62	62	75	65	81
63	63	80	70	78

Source: Posttest Scores and Class IX-AB Questionnaire Scores

Evaluate

The final stage of the ADDIE development model is the evaluation stage. Evaluation is carried out to assess the quality of the product before and after implementation. In this evaluation stage, data analysis of the validity of media aspects and material aspects was carried out, and effectiveness data analysis for the research subject. The results of the evaluation of the website-based MERDEKA syntax are as follows.

Validity Data Analysis

Validity data analysis was carried out based on validator assessments on the website-based MERDEKA syntax assessment sheet. The analysis of this validity data includes media aspects and material aspects. The explanation will be described in each of the following aspects.

The media aspect assessment sheet includes twenty indicators that are divided into four media aspects that must be met. The results of the media aspect can be seen in the following table.

Based on the *assessment of validators* on the media aspect, the average score for validator 1 was 4 with a percentage of 80% indicating a good category, and the average score for validator 2 was 4.2 with a percentage of 84% indicating a good category. From the analysis of media aspects, it can be concluded that the MERDEKA syntax learning media based *on websites* is appropriate and feasible to be implemented.

Table 14 Media Expert Validation Results

No	Aspects	Average		Category	
		Validator 1	Validator 2	Validator 1	Validator 2
1	Common	4	4,3	Good	Good
2	Software Engineering	4	4,2	Good	Good
3	Visual and Audio Communication	4	4,3	Good	Good
4	Student Development	4	4	Good	Good
Overall Average		4	4,2	Good	Good

Source: Media Validator Assessment

And then,

Table 15 Material Expert Validation Results

No	Component	Average		Category	
		Validator 1	Validator 2	Validator 1	Validator 2
1	Content Eligibility	4,2	4	Good	Good
2	Readability of Writing	4,25	4,25	Good	Good
3	Presentation Eligibility	4,3	4,3	Good	Good
Overall Average		4,25	4,2	Good	Good

Source: Material Validator Assessment

Based on the validator's assessment on the material aspect, the average score for validator 1 was 4.25 with a percentage of 85% indicating a good category, and the average score for validator 2 was 4.2 with a percentage of 84% indicating a good category. Judging from the results of the material validation by the material expert validator, it can also be concluded that the website-based MERDEKA syntax learning media is feasible to be implemented.

Effectiveness Data Analysis

The effectiveness of the MERDEKA syntax learning media is seen from the difference in the percentage of *pretest* and *post-test completion* as well as the results of the teacher response questionnaire and the student's questionnaire response which will be explained in detail as follows

Data Analysis Pretest posttest

Based on the results of the study, the data was presented into a frequency distribution table using 7 classes with a class length of 10.

Table 16 Frequency Distribution of *Pretest* and *Post-test Results*

Interval Classes	Frequency (f)	
	<i>Pretest</i>	<i>Post-test</i>
25 – 34	3	0
35 – 44	3	0
45 – 54	11	3
55 – 64	9	10
65 – 74	13	20
75 – 84	18	22
85 - 100	6	8

Based on the table above, it can be seen that the number of students in the lower interval class has decreased, while the upper interval class has increased. And the descriptive results of the *Pretest* and *Post-test* can be seen in the following distribution graph.

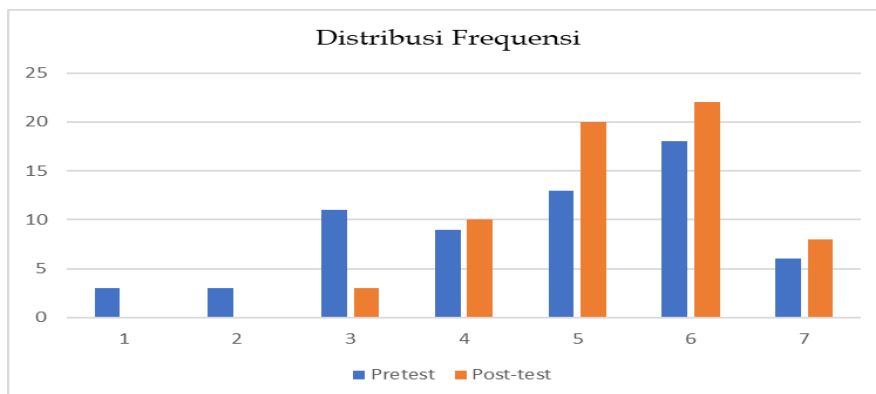


Figure 5 *Pretest and Post-test Frequency Distribution Graph*

Descriptive Data Pretest and Post-test Result

Descriptive data displays the lowest (minimum), highest value (maximum), average (mean) score of *pretest* and *post-test* results. This description data is processed using SPSS version 27 presented in the following table.

Tabel 17 Descriptive statistics of *Pretest* and *Posttest* Results

Report		
	Pretes	Postes
Mean	63.97	73.65
N	63	63
Std. Deviation	15.968	8.241
Minimum	25	50
Maximum	90	90

Based on the table above, it can be seen that the lowest score of the *pretest* is 25 and the highest score is 90, with an average of 63.97, and while in the post-test the lowest score is 50 and the highest score is 90 with an average of 73.65

Data on the Completeness of Pretest and Post-test Results

In the following table, data on the completeness of *pretest* and *post-test* results is presented, where for KKM determined based on document I data is 65. Pretest and post-test completion data can be seen in the following table.

Table 18 Descriptive statistics of *Pretest* and *Post-test* Completeness

Completeness	Pretest		Post-test	
	Sum	Percentage	Sum	Percentage
Complete	37	58,73%	50	79,36%
Incomplete	26	41,27%	13	20,63%

It can be seen from table 4.59 that when the *pretest* was carried out, the number of students obtained a score below 65 as many as 26 people or 41.27%, while when the post-test was carried out, the number of students above 65 was 50 people or 79.36%.

Questionnaire Analysis

Questionnaire analysis is used to determine the practicality of the products produced. The questionnaire data taken was a questionnaire given to teachers and a questionnaire to students. The results of the questionnaire of teachers' responses to the website-based MERDEKA syntax learning media can be seen in the following table.

Table 19 Teacher's Response to the MERDEKA Website-Based Syntax

No	Indicator	Score
1	Learning with a website-based MERDEKA syntax is more interesting	5
2	Website-based MERDEKA syntax learning media is very helpful in learning	4
3	Learning with MERDEKA syntax media based <i>on websites</i> makes students more independent	4
4	Learning with MERDEKA syntax media based <i>on websites</i> makes students more able to work together in solving problems	4
5	Learning with MERDEKA syntax media based <i>on websites</i> makes students better understand the teaching material	5
6	Learning with MERDEKA syntax media based <i>on websites</i> facilitates students to be more active and creative	5
7	Learning with website-based MERDEKA syntax media makes students more responsible	4
8	Learning with MERDEKA syntax media based <i>on websites</i> allows students to increase their curiosity	4
9	Learning with MERDEKA syntax media based <i>on websites</i> can improve students' literacy	4
10	Learning with website-based MERDEKA syntax media can improve students' learning outcomes	5

Source: Teacher's questionnaire answers

Based on the teacher's assessment, an average of 4.4 was obtained, and the assessment criteria with the table above show the criteria of agree. In addition to teachers, students also responded to the website-based MERDEKA syntax learning media that had been developed

Table 20 Students' Response to the Website-Based MERDEKA Syntax

No	Class	Average Syntax Values (%)							Grade Point Average
		Mulai dari Diri	Eksplorasi	Ruang Kolaborasi	Demonstrasi Kontekstual	Elaborasi	Koneksi Antar Materi	Aksi Nyata	
1	Class IX-A	86	83	89	88	91	86	87	87
2	Class IX-B	82	80	86	85	88	83	83	84
Average per syntax		84	81,5	87,5	86,5	89,5	84,5	85	85,5
Category		B	B	SB	B	SB	B	B	B

Source: Student Questionnaire Data

Targeting the above results shows that the average syntax component starting from self is 84% with the good category, the exploration component is 81.5% with the good category, the collaboration space component is 87.5% with the very good category, the contextual demonstration component is 86.5% with the good category, the elaboration component is 89.5% with the very good category, the connection component between materials is 84.5% with the good category, and a real action component of 85% in the good category. Overall, the average score of the questionnaire was 85.5% with the good category, meaning that the independent syntax media was categorized as agreed.

This research develops a website-based MERDEKA syntax learning media. The manufacturing process is carried out in accordance with the flow of the ADDIE development model which consists of 5 stages combined with the development model developed by Borg and Gall in the develop stage. The product that was previously planned was then produced as an initial product from the design and then approved and validated by a validator of media and material experts before the product was tested on a small scale. After being tested on a small scale, then a revision of the validator's record is carried out and the result is in the form of a revision product that will be tested again in a wider scale trial. After a wider scale trial, the researcher made revisions to the websites which included material revisions, display revisions, navigation revisions and evaluation revisions. Then it was tested again on a large scale from 1 class trial to 2 class trials and large-scale trials in 3 classes. Then after being tested on a large scale, it was revised again, the most important revision where the learning was divided into 2 meetings, namely for syntax starting from self and exploration was carried out at the first meeting, while the syntax of the collaboration space, contextual demonstration, elaboration, connection between materials and real action was carried out at the 2nd meeting. After being revised, it was then implemented in 2 classes, namely in class IX-A and class IX-B which total 63 students.

After being implemented in the research class, the researcher carried out the last stage, namely the evaluation stage where teachers and students were given a questionnaire to see the response during learning. From the results of the questionnaire analysis above, we can see the percentage of questionnaire answers obtained by teachers with a score of 4.4 with a percentage of 88%. These results are in the very good or very appropriate category. This shows that teachers strongly agree that learning is carried out using the MERDEKA syntax based on websites that have been developed. Then judging from the results of the questionnaire given to the students, it resulted in a score of 85.5% in the good category, this shows that the students agree to learn using the MERDEKA syntax learning media based on websites that have been developed

Improving Science Literacy

Before looking at the results of whether the website-based MERDEKA syntax learning media can really improve students' science literacy competence, the researcher first analyzes the relationship between *the post-test* and the results of the questionnaire produced from the students. To see the relationship, a linear regression test was carried out. The steps for analysis are as follows.

Linearity Test

This linearity test is to see the relationship between variable X (independent), namely the MERDEKA syntax, and variable Y (dependent), namely science literacy competence. This test was carried out using SPSS version 27 (Scatter Plot chart).

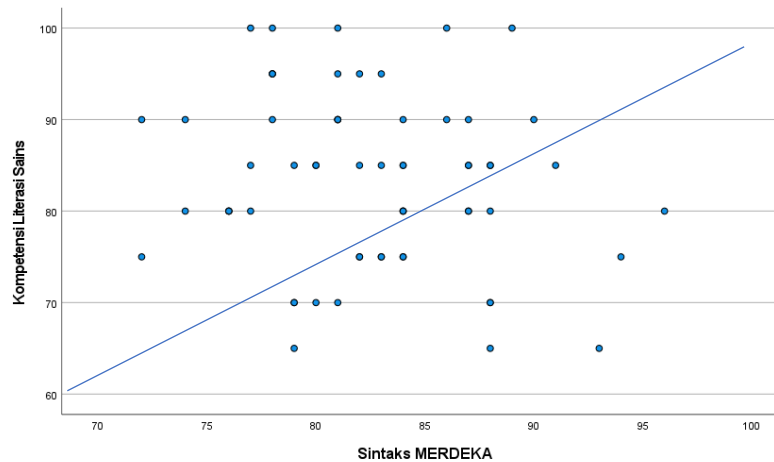


Figure 6 Pretest and Post-test Frequency Distribution Graph

Based on the results of the *Scatter Plot chart* above, it can be seen that the data plot points form a straight-line pattern from the bottom left up to the top. This hail shows that there is a linear and positive relationship between the syntax variable MERDEKA (X) and the variable of science literacy competence (Y). The researcher can conclude that the MERDEKA syntax can improve students' science literacy competencies.

Normality Test

The normality test is used to test whether the data used in the study is normally distributed or not. This normality test is one of the requirements in the hypothesis test that will be proven. The normality test that will be used is the Shapiro-Wilk test with SPSS version 27; here are the results.

Tabel 21 Normality variable X-Y

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Sintaks MERDEKA	.092	63	.200 [*]	.985	63	.633
Kompetensi Literasi Sains	.110	63	.055	.960	63	.037

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Source: SPSS data processing

Based on the results of the calculation of the normality test above using SPSS, we can see that the significance value of Asymp. The Sig. Kolmogorov-Smirnov is 0.200 and 0.055. The researcher concluded that if the variables are more than 0.05, it can be said that the MERDEKA Syntax and Science Literacy Competency are distributed normally.

Heteroskedasticities Test

Based on the results of the calculation of the normality test above using SPSS, we can see that the significance value of the Sig. of the MERDEKA syntax variable is 0.194. The researcher concluded that if the variable is more than 0.05 then it can be said that there are no symptoms of Heteroscedasticity in the regression model.

Table 22 Table Heteroskedasticity variable X-Y

Coefficients ^a					
Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
	B	Std. Error			
1	(Constant)	107.970	18.778	5.750	<.001
	Sintaks MERDEKA	-.298	.227	-.166	.194

a. Dependent Variable: Kompetensi Literasi Sains

Source: SPSS data processing

Linear Regression Test

Linear regression analysis is an analysis used to find out whether there is an influence of variable (X), namely the website-based MERDEKA syntax on the variable (Y), namely Science Literacy. This *linear regression* analysis is to answer the hypothesis.

Based on calculations using SPSS version 27, the results are as follows.

Tabel 23 Variable X with Enter Method

Variables Entered/Removed ^a			
Model	Variables Entered	Variables Removed	Method
1	Sintaks MERDEKA ^b	.	Enter

a. Dependent Variable: Kompetensi Literasi Sains

b. All requested variables entered.

Source: SPSS data processing

Next, from the results of SPSS processing, we take a coefficient table to take the data needed in the *linear regression* equation. Here are the results.

Tabel 24 Coefficient Variable X-Y

Coefficients ^a					
Model		Unstandardized Coefficients		Standardized Coefficients	Sig.
		B	Std. Error	Beta	
1	(Constant)	107.970	18.778		<.001
	Sintaks MERDEKA	-.298	.227	-.166	.194

a. Dependent Variable: Kompetensi Literasi Sains

Source: SPSS data processing

From the results above, we can see that the value of the coefficient is negative (-), which means that the variable X, namely the website-based MERDEKA syntax, has an effect on the variable Y, namely science literacy. The value (a) is the constant $a = 107.970$ and the value (b) is the coefficient, $b = -0.298$, then the regression equation is as follows.

$$\hat{Y} = a + bx = 107,970 - 0,298 X$$

To ascertain whether the regression coefficient is significant or not (whether x affects the Y variable), the researcher conducted a hypothesis test (t-test). The researcher compared the t_{cal} value with the t_{table} value. The SPSS result calculation was -1.315 (table 4.66). Next, the researcher searched for the value of the table by looking for the *degree of freedom* (df).

$df = N - 2 = 63 - 2 = 61$, then looking at the table t (attached) with a factor of $5\% = 0.05$, the t_{table} value is 1.296.

Since the calculated t-value of -1.315 is greater than $> t_{table}$ value of 1.296, it can be concluded that H_0 is rejected and H_1 is accepted. The hypothesis proposed by the researcher is as follows.

H₀:	There is no influence of the website-based MERDEKA syntax on improving science literacy on the subject of human reproductive system science subjects
H₁:	There is an influence of the website-based MERDEKA syntax on improving science literacy on the subject of human reproductive system science subjects

Looking at the hypothesis made by the researcher, it can be concluded that "There is an influence of the website-based MERDEKA syntax (X) on Science Literacy Competency (Y). The value of t calculated -1.315 is considered to be greater than the t of table 1.296, in a simple linear regression analysis, the researcher describes the regression curve as follows.

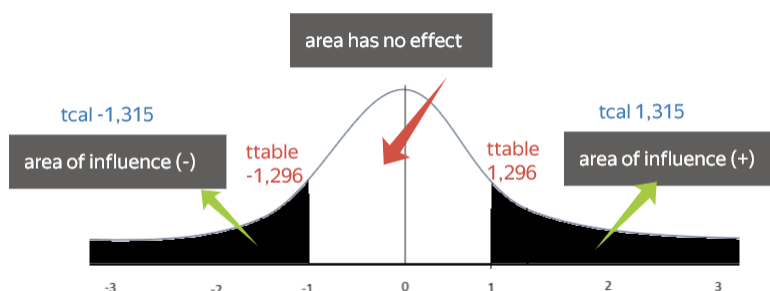


Figure 7 Variable Influence Area Curve X

Based on the curve image above, it is known that the t-value of -1.315 is located in the area of negative influence, so it can be concluded that "There is a negative influence of the website-based MERDEKA syntax (X) on Science Literacy Competency (Y)".

Next, the researcher examined the results of the Model Summary table on the SPSS results to determine the magnitude of the influence of variable X on Variable Y. The guideline taken was on the value of R Square or R².

Table 25 The Magnitude of X Influence (*Summary Model*)

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.166 ^a	.028	.012	9.321

a. Predictors: (Constant), Sintaks MERDEKA

b. Dependent Variable: Kompetensi Literasi Sains

Source: SPSS data processing

Based on the data of the *Model Summary* table produced through the SPSS calculation above (table 4.67), the researcher concluded that "the MERDEKA syntax based on websites (X) on Science Literacy Competency (Y) with a total influence of 2.8%, while 97.2% was by other variables that were not studied.

Based on the above discussion, the researcher can conclude that "the syntax of MERDEKA based on websites (X) on science literacy competence (Y) with a total influence of 2.8%. This negative influence means that the decline of the website-based MERDEKA syntax will affect the improvement of science literacy competence.

Implication

The implication of this study is the development of a website-based MERDEKA syntax on the subject of the human reproductive system of science subjects as follows.

This development research has an impact on teachers to implement changes in the learning process by using media, learning methods and models so that learning is more effective, efficient, active, interesting and fun, so that teachers do not use conventional/classical ones.

The students' response to the MERDEKA website-based syntax learning media that was applied provided good enthusiasm because previously students rarely got models or media applied in learning media.

This research can provide students with a better understanding of reproductive material in humans.

This development research has an impact on improving students' literacy, especially in science literacy by utilizing mobile phones as a means of learning in today's era.

This research also encourages teachers to be able to take advantage of infrastructure facilities in schools and can be used properly, namely:

Computer Laboratory. This infrastructure is an important element in implementing website-based learning.

Laptop/ Computer. The products developed need to have carrying capacity to support the website-based learning process to implementation in schools (SMP). In this case, computers cannot be separated between the use of laptops/computers in this study.

Internet . The Internet or interconnected network can be used as a means of exchanging information from one computer to another in a short time, without being limited by the distance between the two computers. Any computer connected to the network can communicate in the form of data and information exchange. This can be done in real-time, two-way communication. Therefore, in this website-based research and learning, it is inseparable from internet access.

LCD Projector and LCD Projector Screen. This facility is a supporting media technology that can be used and used to display and introduce products as a website-based learning media in front of grade IX of SMPN 2 Kersamanah which will be carried out by science teachers. The teacher as a learning facilitator explains how to use website-based learning media in the product produced so that all students understand the overall learning flow.

Mobile. Mobile phones (HP) are used by researchers, teachers and students. The researcher used this means to try to access the products produced through the cell phone display, for cell phone teachers it can be a control tool and an alternative if they do not have a laptop, and while students to carry out website-based learning with the MERDEKA syntax at the second meeting.

Speakers. This tool is an additional tool as a loudspeaker that needs to be owned by the user. Laptops, computers and cell phones have speakers in them that can help the learning process of teachers and students take place properly.

Webmaster. Webmaster is an important component that must be owned by researchers as a developer of the resulting website products.

IV. Conclusion and Recommendation

Conclusion

Based on the results of research and discussion on the development of a website-based MERDEKA syntax in improving the science literacy competence of students in this science subject, the development of this ADDIE-based product resulted in the following conclusions.

The analysis of the need for a website-based MERDEKA syntax on the subject of human reproduction includes the analysis of primary data and secondary data. Primary data analysis consists of: 1) analysis of teacher characteristics and development needs; 2) analysis of student characteristics and learning problems; 3) analysis of school facilities and environment; 4) Analysis of the needs of learning resources. Meanwhile, secondary data analysis consisted of: 1) curriculum analysis; and 2) analysis of learning outcomes.

The design of the website-based MERDEKA syntax on the subject of human reproduction starts from collecting information or data, making a design (selecting and setting software, creating website designs, creating learning flows, creating storyboards, and creating teacher and student guide modules, as well as creating learning flowcharts with websites-based MERDEKA syntax). The software used in this study is google sites, the development of the instrument using manuals and google forms, and compiling assessment instruments using google forms.

Development of a website-based MERDEKA syntax on the subject of human reproduction using the 11-stage Borg and Gall model. The stages are as follows: 1) Research and information collecting; 2) Planning; 3) Develop Preliminary of product; 4) Preliminary field testing; 5) Main product revision; 6) Main field test; 7) Operational product revision; 8) Operational field testing; 9) Final product revision; 10) Implementation; and 11) Dissemination.

The implementation of the website-based MERDEKA syntax on the subject of human reproduction is carried out at the stage of the implementation of Borg and Gall, a finished product that has been used for the learning process.

Evaluate the MERDEKA website-based syntax on the subject of human reproduction aims to find out feedback on the products that have been developed. This evaluation was declared valid for future use, and the results obtained by the researcher were good and feasible to be used in the learning process. The website-based MERDEKA syntax learning media can be accessed through: <https://gosains.smpn2kersamanah.sch.id>.

The development of a website-based MERDEKA syntax on the subject of human reproduction can have an effect on improving students' science literacy competence. The negative influence on the results of the analysis of this research means that the decline of the website-based MERDEKA syntax will affect the improvement of science literacy competence.

Recommendation

From the results of the analysis and conclusions, the researcher provided the following recommendations:

Research on the development of MERDEKA syntax learning media based on Websites on the subject of human reproduction has a positive impact and improvements in learning. For this reason, the researcher hopes that the school will develop similar research that can make a positive and supportive contribution to the success of learning.

Research on the development of web-based MERDEKA syntax learning media on the subject of human reproductive system science subjects at SMPN 2 Kersamanah can improve science literacy competence. For this reason, teachers who carry out learning on similar subjects or in other subjects should use the MERDEKA syntax in their learning.

In connection with this study, it focuses more on the MERDEKA syntax learning media on the subject of human reproduction, so the researcher suggests to other parties to conduct research that focuses on the MERDEKA syntax learning model. The researcher also hopes that in future research, other researchers can conduct follow-up research on other subjects.

Abbreviations

MERDEKA	Mandiri, Eksplorasi, Ruang Kolaborasi, Demonstrasi, Elaborasi, Koneksi, Aksi
SLC	Science Literacy Competences
MCC	Minimum Completeness Criteria
ICT	Information and Communication Technology

Availability of Data and Materials

The datasets used or analyzed during the current study are available from the corresponding authors upon reasonable request.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors.

V. Acknowledgements

The researcher expressed his gratitude to the lecturers for the assignment of the Research and Publication of Postgraduate Learning Technology course of IPI Garut which was given to research web-based online learning problems. The researcher did not forget to thank his friends who helped in distributing the survey form and a special thank you to all respondents of State Junior High School students in Garut

Declaration

I, as a solo author, accept statements below on compliance with ethical standards and standards of research involving humans:

“All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.”

“Informed consent was obtained from the participants”

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