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Improving Numeracy Literacy Through the Integration of Challenge Based on Differentiated Learning with STEAM Based Website

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Abstract

Numeracy literacy is essential for 21st-century skills, yet student proficiency remains low. Improving it requires enhancing learning quality through digital innovation, contextual learning, and personalized approaches. Digital platforms offer flexible resources, while STEAM disciplines foster problem-solving skills. Challenge-Based Learning (CBL) provides contextual, project-oriented experiences, supported by differentiation strategies (visual, auditory, kinesthetic). The purpose of this research is to develop a STEAM-based website integrated with challenges based on differentiated learning which is very valid and very practical to improve students' numeracy literacy. This research method used Research and Development (R&D) method with ADDIE model, the research involved junior high students, collecting data via interviews and questionnaires. Results showed product is very valid (89.95% expert validation) and very practical (93.80% from practitioners, 93.16% from students). Thus, differentiated, CBL-STEAM learning can significantly improve learning quality and support broader educational goals.

1. Introduction

The 21st century demands humans to face complex global challenges. To face these challenges, students must be equipped with 21st century skills (Chalkiadaki, 2018). One of the skills needed is numeracy literacy. Numeracy literacy is an individual's ability to analyse, use, and interpret numbers in various real contexts (Rakhmawati & Mustadi, 2022). Numeracy literacy is a skill in dealing with real problems that are often encountered by students in everyday life (Suryadi, 2019). However, in reality, students' numeracy literacy still needs to be improved. Efforts to improve numeracy literacy can be done by improving the quality of learning.

This is shown by the results of an international research, namely the Programme for International Student Assessment (PISA) 2022. The decline in student learning outcomes was felt on an international scale after going through the pandemic. PISA 2022 showed a decline in scores in the numeracy literacy aspect internationally, including a decline in scores in Indonesia. Based on the results of PISA 2022, Indonesia's numeracy literacy score decreased from 378 to 366 (OECD, 2023). These results show that there is still a gap in numeracy literacy in Indonesia. So, this is important to pay attention to and fix. The condition of education in Indonesia can be improved through the quality of learning. To deal with this, the use of technology helps implement solutions to the root of educational problems (Wang et al., 2023). One of them is through innovation in digital learning media. Therefore, efforts that can be made are technology-based learning oriented to contextual learning that meets the learning needs of students so that it has the potential to improve students' abilities at various levels.

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Website integrated with Challenge Based Learning (CBL) with learning differentiation strategy. Website assisted digital learning provides sufficient learning resources in the digitalized learning process without any limitations of space and time (Taqwa & Raupu, 2022). Science, Technology, Engineering, Art and Mathematics (STEAM) are disciplines that train students to solve complex problems (Keane & Design, 2016). The application of STEAM in learning provides real activities and gains learning experiences to open up opportunities for students to explore, observe, find, and implement solutions to real challenges, so it can improve students' numeracy literacy. The use of interactive website helps students solve contextual and complex problems. Not only that, students use an interactive website, it can improve students' numeracy literacy. Challenge Based Learning (CBL) as a learning model that supports the improvement of 21st century skills (Nichlos et al., 2016). CBL improves numeracy literacy with a learning process that involves solving real challenges (Kurniawati et al., 2019). The strategy of differentiating content, products, and processes by paying attention to learning styles (visual, auditory, kinesthetic) can optimize student learning outcomes and meet their learning needs (Evalina & Aritonang, 2023). Learning differentiation was carried out based on aspects of ICT-assisted learning styles is effective in improving students' numeracy literacy when compared to slide-assisted learning. Technology based learning assisted by a STEAM based website integrated with challenge based on differentiated learning can be an innovation to meet student learning needs and open up the potential for quality learning at various levels.

This innovation can be a creative, applicable, and appropriate solution as a medium that accommodates distance learning without having to meet face to face. Distance learning assisted by a STEAM based website integrated with challenge based on differentiated learning not only facilitates learning access but also provides for students' learning needs. This innovation has the potential to be developed to improve the quality of learning at various levels of education. Learning models, approaches and strategies can improve students' numeracy literacy which also supports the achievement of learning quality in education quality.

Based on the background of the problems that have been identified, technology-based learning innovation by developing learning media can be an effort to achieve comprehensive learning quality. Therefore, it is necessary to provide digital learning media that can improve students' numeracy literacy. Based on the formulation of the problem, the purpose of this research is to develop a STEAM-based website integrated with challenges based on differentiated learning which is very valid and very practical to improve students' numeracy literacy.

2. Methods

This research method used the Research and Development (R&D) method. Development research aims to produce products and test the effectiveness of the products produced (Sugiyono, 2022). Product development research will be carried out in stages consisting of five stages, namely Analyze, Design, Development, Implementation, and Evaluation. In this research, the product developed is a STEAM-based website integrated with challenges based on differentiated learning to improve students' numeracy literacy.

This research was conducted to test the validity and practicality of the website based on STEAM integrated challenge based on differentiated learning. The steps in conducting the research will be shown in Figure 1 below.

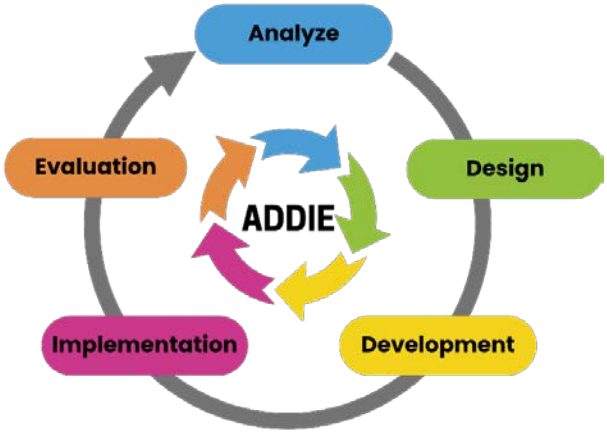

Figure 1. ADDIE Research Stages

This research was conducted by testing the website online or remotely. The population of this research were junior high school students. The sampling technique in this research was by using the cluster random sampling technique, namely determining the sample randomly. The research sample will be selected randomly at each level, namely grades VII, VIII, and IX, each of which takes a sample of as many students.

Data collection techniques in this research are interviews and questionnaires. The research instrument that will be used in this research is a questionnaire sheet that will be given to experts and practitioners to validate the product. Student response questionnaires to find out student responses after using the product. Interview guidelines will be used to analyse product needs and design.

The data analysis technique of this research uses descriptive analysis techniques qualitatively and quantitatively. Quantitative data analysis is used to analyse data collected from expert and practitioner validation questionnaires and student response questionnaires. Quantitative data is obtained from the results of calculations using a Likert scale. Meanwhile, qualitative data in this research consists of comments and suggestions on product assessment sheets by experts, practitioners, and students. Qualitative data analysis is used as a reference for revising the website being developed.

The website validation questionnaire will be given to 3 experts. Validity testing is carried out to test the validity of the website as a learning medium that improves numeracy literacy. To find out the final value of the statement items, it can be done using the formula $P = \frac{\text{total score}}{\text{maximum score}} \times 100\%$ with P is the percentage score. Furthermore, the final results of the website validation will be categorized according to the media feasibility validation criteria shown in table 2.

Table 1 Assessment Criteria Using the Likert **Scale**

Score	Information
1	Not good
2	Pretty good
3	Good
4	Very good

(Table Source: Sugiyono, 2022)

Table 2 Validity Test Criteria

Percentage Score	Information
81%-100%	Very Valid
61%-80%	Valid
41%-60%	Quite Valid
21%-40%	Invalid
<21%	Totally Invalid

(Table Source: Taqwa & Raupu, 2022)

The response questionnaire was given to students and practitioners. The student response questionnaire was given to 10 students in grade VII, 10 students in grade VIII, and 10 students in grade IX. The practitioner response questionnaire was given to 5 practitioners. The response test was conducted to determine the response to the product developed to determine the practicality of the product developed. To determine the final value of the statement items, it can be done using the formula $P = \frac{\text{total score}}{\text{maximum score}} \times 100\%$ with P is the percentage score. Furthermore, the final results of the practicality of the website will be categorized according to the practical criteria as a media shown in table 3.

Table 3Media Practicality Criteria

Percentage score	Information
81%-100%	Very Practical
61%-80%	Practical
41%-60%	Quite Practical
21%-40%	Not Practical
<21%	Very Impractical

(Table Source: Taqwa & Raupu, 2022)

3. Results & Discussions

3.1 Results

3.1.1 Analysis Stage

At the student analysis stage, the researcher interviewed 2 students and 2 mathematics practitioners randomly. Based on the interview results, the researcher found that students enjoy learning using technology. Students are accustomed to using technology-based learning including Google Classroom. However, students feel that textbooks do not sufficiently accommodate their talents or learning styles. Not only that, students rarely learn with STEAM-themed media in learning. Furthermore, based on the results of interviews with practitioners, students have not been trained in connecting mathematics as an applied science in everyday life. This can be seen from the results of the interview which showed that students prefer learning in the form of challenges and extensive learning resources. Therefore, it is necessary to develop technology-based learning media in the form of a website using a differentiated challenge-based learning model with STEAM-themed learning styles to improve students' nuance literacy. Students and practitioners will be helped by the existence of additional learning resources that are independent of time and place to access them. Distance learning will be helped by the existence of this media.

At the analysis stage, it is carried out before developing the website. At this stage, two stages are carried out. In website development, student analysis and website development needs analysis are carried out. At the website development needs analysis stage, researchers conducted observations of tools for creating websites. Researchers found that in creating a website, they can use the website features available in Canva with the help of hyperlinks. The Canva feature that helps create a website turns out to be the latest and most appropriate thing when studied. In addition, the elements and illustrations in Canva are also interesting to use as website decorations.

3.1.2 Design Stage

This analysis was conducted to identify materials and compile learning materials in a structured manner. At this stage, the researcher determines the materials, learning outcomes, and learning objectives to be achieved by students using the website . The website will be developed at all three grade levels with the materials compiled being algebraic forms and operations for grade VII of junior high school, linear equations for grade VIII of junior high school, and geometric transformations for grade IX of junior high school. Furthermore, the identification and compilation of material concepts from each level is carried out. Based on the 2022 independent curriculum book for mathematics subjects, a concept map of algebraic forms and operations material is obtained as shown in Figure 2. Furthermore, the concept map of linear equations material is shown in Figure 3. The concept map of geometric transformation material is shown in Figure 4.

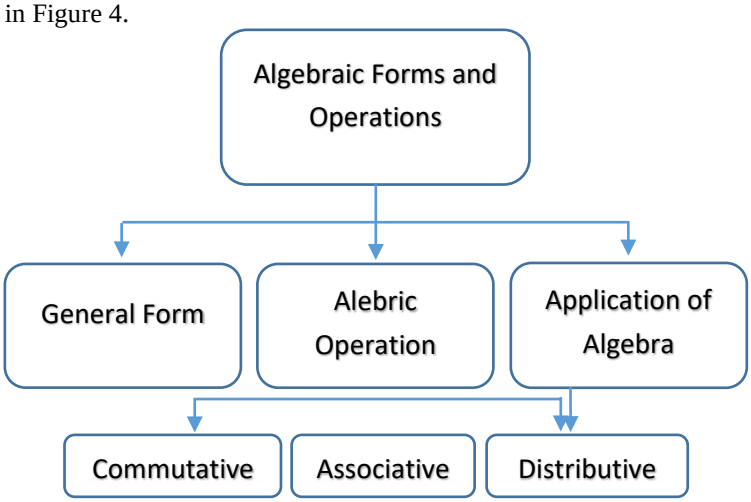

Figure 1Map of Algebraic Forms and Operations

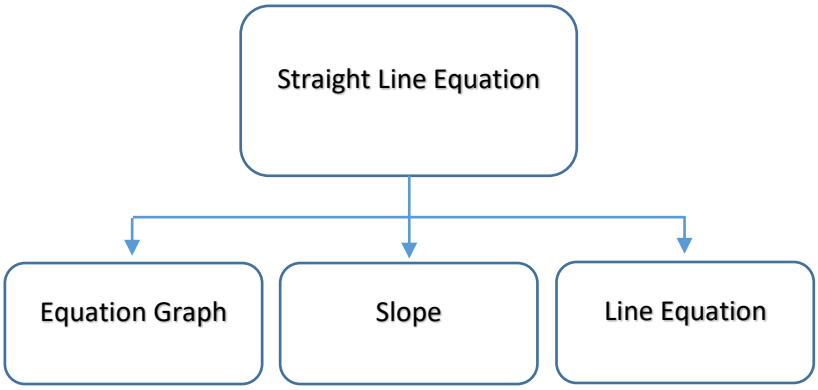

Figure 2 Concept Map Straight Line Equation

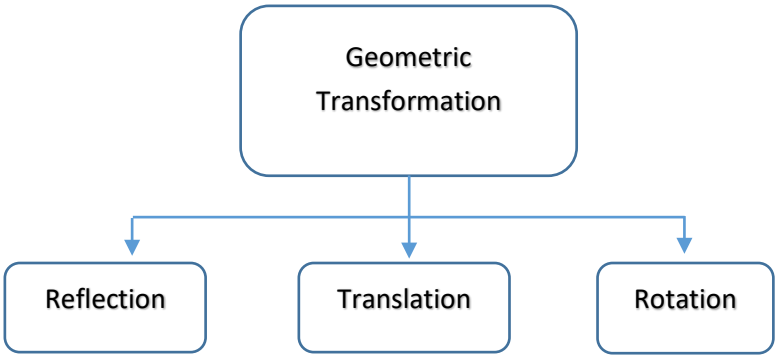

Figure 3Transformation Concept Map

Based on the concept map, the learning objectives that will be implemented on the website and will be developed by researchers can be seen in tables 4, 5, and 6.

Table 4of Material on Algebraic Forms and Operations

Learning objectives
After participating in the Challenge Based on Differentiated Learning Styles learning with a STEAM nuance, 1. students can identify constants, coefficients, variables and terms in algebraic forms correctly. 2. students can express a contextual problem with STEAM nuances in algebraic form correctly.

Table 5 Learning Objectives of Straight Line Equation Material

Learning objectives
After participating in the Challenge Based on Differentiated Learning Styles learning with a STEAM nuance; 1. students can distinguish between explicit and implicit forms of linear equations correctly. 2. students can draw straight lines in Cartesian coordinates.

Table 6of Geometric Transformation Material

Learning objectives
After participating in the Challenge Based on Differentiated Learning Styles learning with a STEAM nuance; 1. students can explain the meaning of translation/shift correctly. 2. students can describe translations using Cartesian coordinates correctly. 3. students can apply translation to real problems appropriately. 4. students can explain the meaning of reflection correctly. 5. students can describe reflection using Cartesian coordinates correctly. 6. students can apply reflection to real problems appropriately.

Task analysis is carried out to determine the assessments on the website that will be adjusted to the learning objectives. The assessment on this website lies in the challenge and assessment. Challenges are given to students in the form of differentiated projects according to learning styles by asking students to explore STEAM elements in everyday life. Assessments contain publications of the results of solutions from challenges that are published to digital platforms. On the website that is developed, there are also guiding questions and guiding activities that can also be used as one aspect of assessing the development of students' numeracy literacy.

At the design stage, before developing the website, the steps taken are to create a content concept for the website. Researchers design features by compiling a website concept, and find that on the website there will be: (1) main page, (2) Product slogan, (3) phase options, (4) element options, (5) material options for each element, (6) learning activity pages according to innovation. The rough website design will be developed optimally according to the analysis of student needs and learning objectives to be achieved.

3.1.3 Develop Stage

The development stage will be carried out in stages, namely creating a product, validating it with experts and making revisions before implementation. First, the researcher creates a website according to the concept that has been designed. This stage is the realization of the website . This website is specifically designed by combining the challenge-based learning model with nuances of science, technology, engineering, art and mathematics . The integration of differentiated learning will be located at the stages of the learning model that makes this website more innovative. The selection of the format on the website is also considered by the researcher. The researcher uses a blue and white theme, poppins and telegraph fonts. The following is the initial design of the website shown in the following images.

Figure 4. Product Navigation Bar

Figure 5 Product Home Page

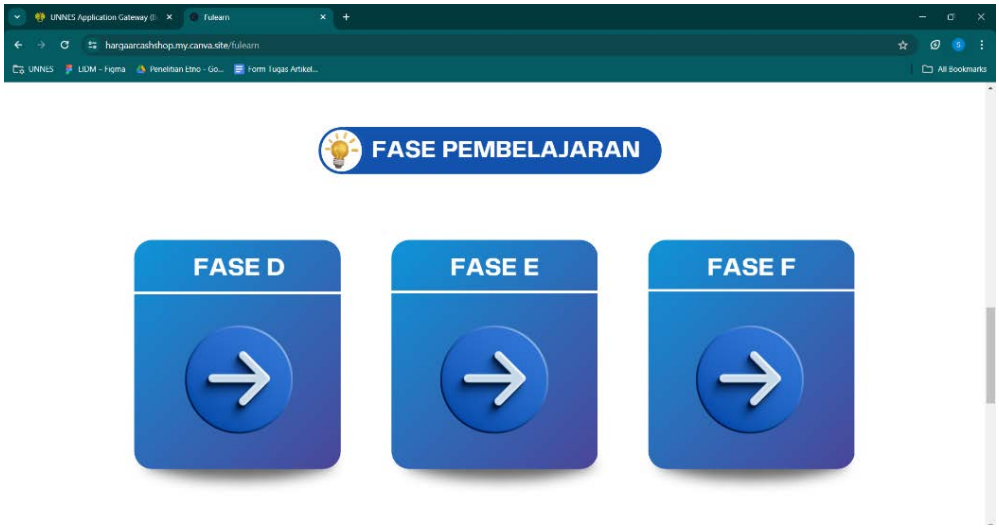

Figure 6 Phase Selection

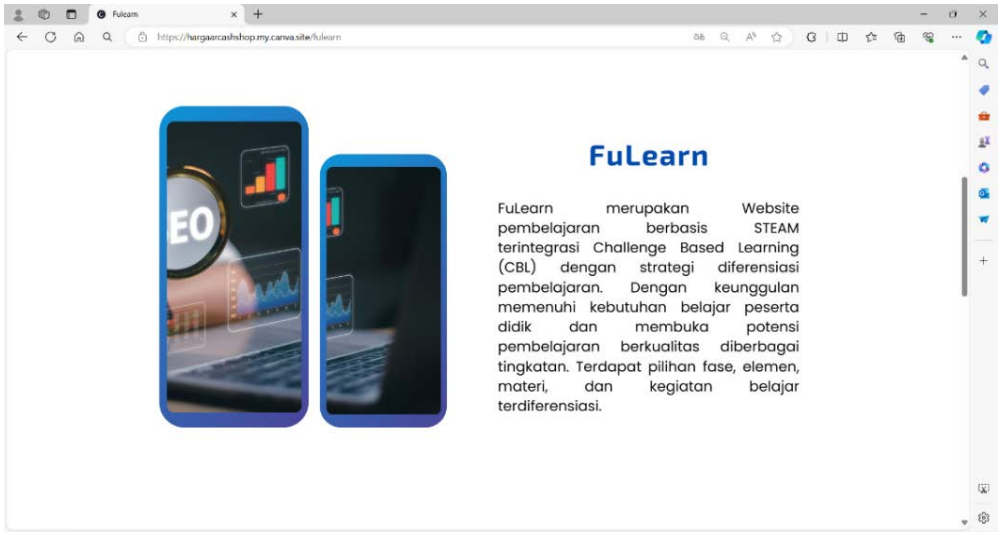

Figure 7 View more about Product page

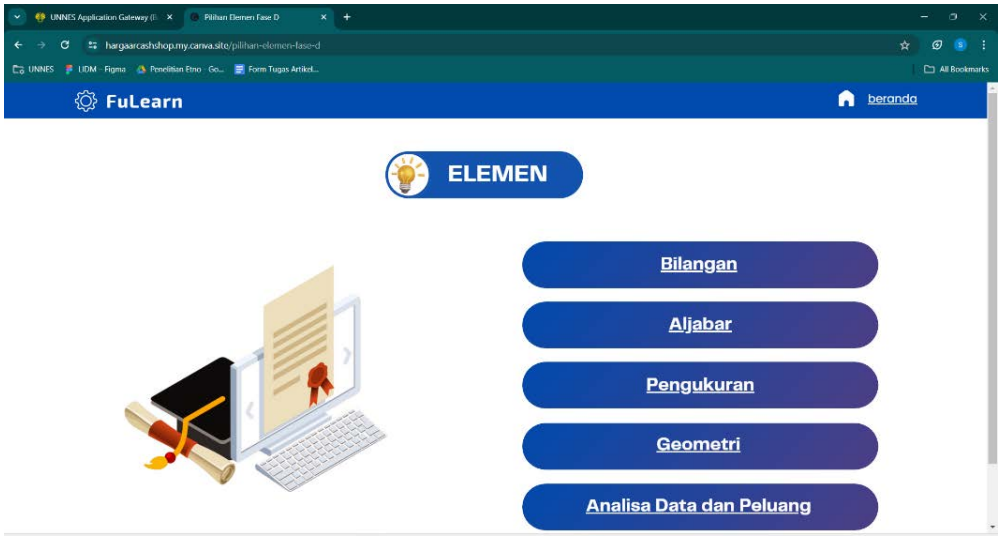

Figure 8 Phase Element D

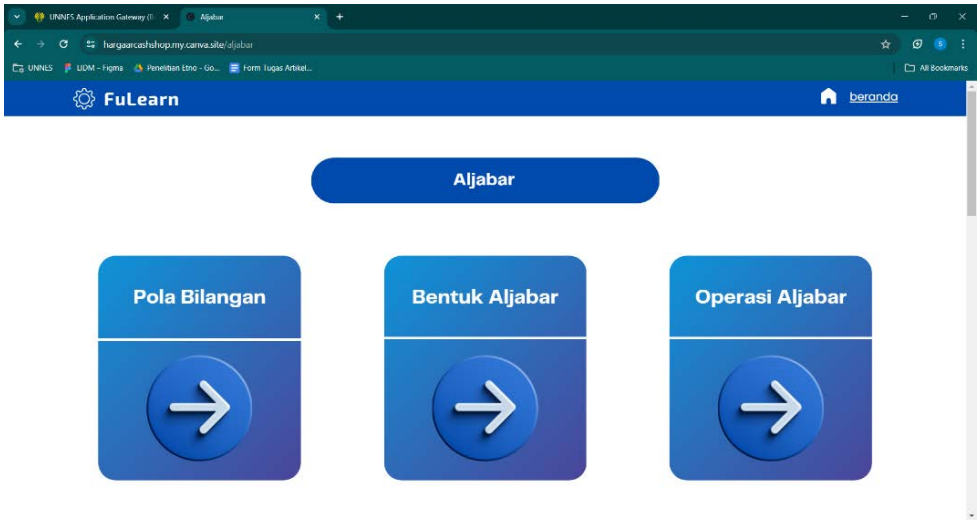

Figure 9 Algebraic Elements Materials

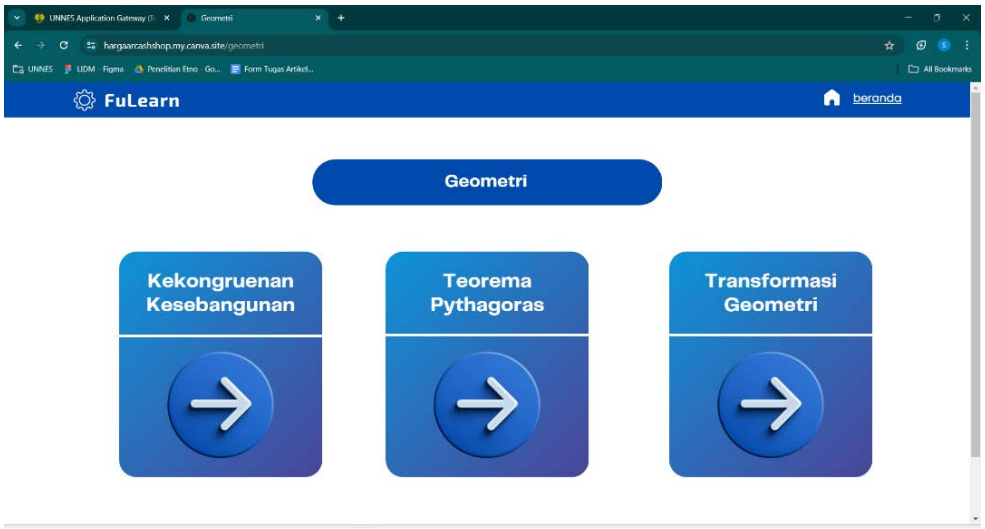

Figure 10 Geometry Element Materials

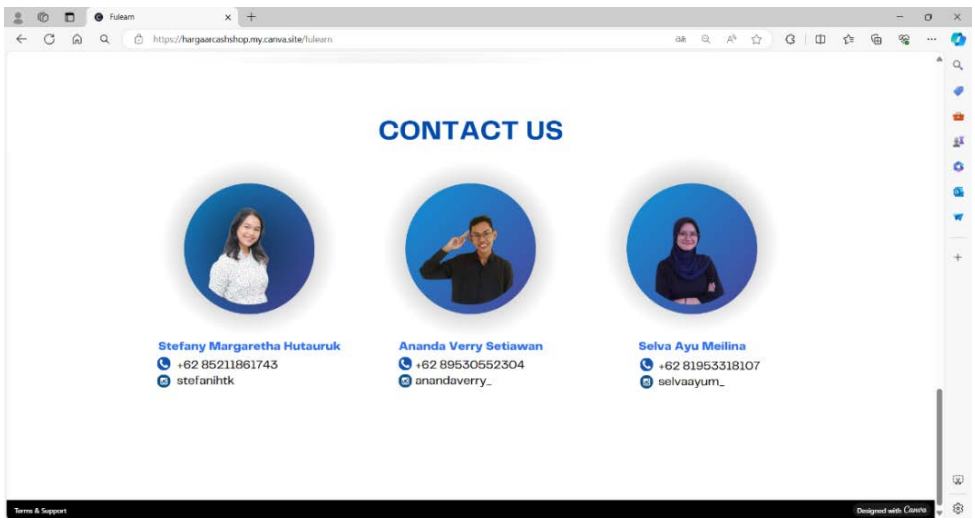

Figure 11. Profile Page

Figure 12 Product Learning Stages

The description of the completed website is as follows.

a. Product Home Page, this section contains the main home button, phase, contact, and product's slogan "Make learning more meaningful".
b. Phase Selection Page, this page will direct users to select the learning phase.
c. get to know page , this page explains a brief description of the website .
d. Element Selection Page, this section directs users to select elements after selecting the learning phase.
e. Material Selection Page, this section contains material choices according to learning elements.
f. Profile Page, this section contains contacts that can be contacted if the website experiences trouble.
g. Learning Activity Page, this page will contain learning stages using CBL differentiated learning styles with a STEAM feel. This page will start from learning outcomes and learning objectives, followed by big ideas to assessments.

Table 7Validation Results 1

Assessment Aspects	Expert 1	
	Percentage	**Criteria**
Content Suitability Aspect	86.54	Very Valid
Presentation Feasibility Aspect	83.33	Very Valid
Linguistic Aspects	90.00	Very Valid
Aspects of Learning Innovation	81.25	Very Valid
Ability Achievement Aspect	75.00	Valid
The final result	84.88	Very Valid

Table 8Validation Results 2

Assessment Aspects	Expert 2	
	Percentage	**Criteria**
Content Suitability Aspect	94.23	Very Valid
Presentation Feasibility Aspect	97.92	Very Valid
Linguistic Aspects	92.50	Very Valid
Aspects of Learning Innovation	100.00	Very Valid
Ability Achievement Aspect	100.00	Very Valid
The final result	95.93	Very Valid

At this development stage, the realization of the research product has been carried out, namely the website based on STEAM integrated with challenge based on differentiated learning which has been designed at the design stage so that the development stage produces an initial product which will then be validated by experts. Validation is carried out by 3 experts, each of whom is tasked according to their expertise to validate. In the media validity test, there are five aspects that are assessed, namely the aspect of content feasibility, the aspect of presentation feasibility, the aspect of learning innovation feasibility, the aspect of language feasibility, and the aspect of ability achievement. The following is a table of validation results using the questionnaire that has been given.

Table 9Validation Results 3

Assessment Aspects	Expert 3	
	Percentage	**Criteria**
Content Suitability Aspect	86.54	Very Valid
Presentation Feasibility Aspect	87.50	Very Valid
Linguistic Aspects	87.50	Very Valid
Aspects of Learning Innovation	93.75	Very Valid
Ability Achievement Aspect	100.00	Very Valid
The final result	88.95	Very Valid

Based on the table, the results of the assessment by the expert validator which are stated on the questionnaire sheet obtained a percentage that falls into the category of very valid with a percentage of 89.95%. The percentage of the website's eligibility from the aspect of content eligibility is. The percentage of eligibility from the presentation aspect is. The percentage of eligibility from the linguistic aspect is. The percentage of eligibility from the learning innovation aspect is. The percentage of eligibility from the aspect of ability achievement is. However, there are still revisions from experts which are then improved. The following are some of the improvements made.

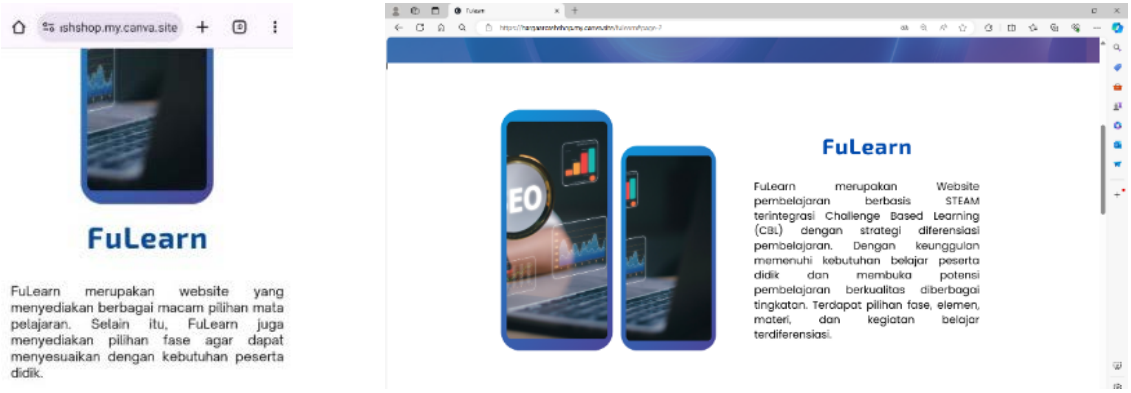

Figure 13 Changes to the Product description, namely adding an explanation of innovation**.**

3.1.4 Implementation and Evaluation Stage

At the implementation stage, the validated media was tested on students and practitioners. The level of practicality of the media was measured through the percentage of the response questionnaire. The product was tried by 10 students in grade VII, 10 students in grade VIII, and 10 students in grade IX. Not only that, the website was also assessed by 6 practitioners who served as mathematics practitioners.

Based on the table of results of the student response test to the media, it falls into the very practical category with a final score of 93.16%. The following are the results of the student response test to the learning media shown in the following tables.

Table 10VII Student Response Test

No	Student Code	Practicality Percentage (P)	Criteria
1	S1	95%	Very Practical
2	S2	92.5%	Very Practical
3	S3	92.5%	Very Practical
4	S4	85%	Very Practical
5	S5	100%	Very Practical
6	S6	90%	Very Practical
7	S7	92.5%	Very Practical
8	S8	87.5%	Very Practical
9	S9	82.5%	Very Practical
10	S10	97.5%	Very Practical
Average		**91.5%**	**Very Practical**

Table 11VIII Students

No	Student Code	Practicality Percentage (P)	Criteria
1	S11	100%	Very Practical
2	S12	90%	Very Practical
3	S13	95%	Very Practical
4	S14	95%	Very Practical
5	S15	95%	Very Practical
6	S16	90%	Very Practical
7	S17	95%	Very Practical
8	S18	97.5%	Very Practical
9	S19	100%	Very Practical
10	S20	92.5%	Very Practical
Average		**95%**	**Very Practical**

Table 12IX Students

No	Student Code	Practicality Percentage (P)	Criteria
1	S21	90%	Very Practical
2	S22	87.5%	Very Practical
3	S23	82.5%	Very Practical
4	S24	97.5%	Very Practical
5	S25	100%	Very Practical
6	S26	100%	Very Practical
7	S27	90%	Very Practical
8	S28	92.5%	Very Practical
9	S29	90%	Very Practical
10	S30	100%	Very Practical
Average		**93%**	**Very Practical**

Based on the results table of practitioner response tests on media, it falls into the very practical category with a final score of 93.80%. The following are the results of practitioner response tests on learning media shown in the following tables.

Table 13 Practitioner Response Results 1

Aspect	Practitioner 1	
	Percentage	Criteria
Content Suitability Aspect	92.50	Very Practical
Presentation Feasibility Aspect	97.22	Very Practical
Linguistic Aspects	92.50	Very Practical
Aspects of Learning Innovation	93.75	Very Practical
Ability Achievement Aspect	100	Very Practical
The final result	94.59	Very Practical

Table 14Response Results 2

Aspect	Practitioner 2	
	Percentage	**Criteria**
Content Suitability Aspect	100.00	Very Practical
Presentation Feasibility Aspect	88.89	Very Practical
Linguistic Aspects	100	Very Practical
Aspects of Learning Innovation	87.50	Very Practical
Ability Achievement Aspect	75.00	Practical
The final result	93.24	Very Practical

Table 15Response Results 3

Aspect	Practitioner 3	
	Percentage	**Criteria**
Content Suitability Aspect	92.50	Very Practical
Presentation Feasibility Aspect	94.44	Very Practical
Linguistic Aspects	100.00	Very Practical
Aspects of Learning Innovation	87.50	Very Practical
Ability Achievement Aspect	93.75	Very Practical
The final result	94.59	Very Practical

Table 16Response Results 4

Aspect	Practitioner 4	
	Percentage	**Criteria**
Content Suitability Aspect	92.50	Very Practical
Presentation Feasibility Aspect	91.67	Very Practical
Linguistic Aspects	87.50	Very Practical
Aspects of Learning Innovation	93.75	Very Practical
Ability Achievement Aspect	93.75	Very Practical
The final result	91.22	Very Practical

Table 17 Practitioner Response Results 5

Aspect	Practitioner 5	
	Percentage	**Criteria**
Content Suitability Aspect	95	Very Practical
Presentation Feasibility Aspect	97.22	Very Practical
Linguistic Aspects	90	Very Practical
Aspects of Learning Innovation	81.25	Very Practical
Ability Achievement Aspect	100	Very Practical
The final result	93.24	Very Practical

Table 18Response Results 6

Aspect	Practitioner 6	
	Percentage	**Criteria**
Content Suitability Aspect	100	Very Practical
Presentation Feasibility Aspect	94.44	Very Practical
Linguistic Aspects	97.50	Very Practical
Aspects of Learning Innovation	87.50	Very Practical
Ability Achievement Aspect	93.75	Very Practical
The final result	95.95	Very Practical

3.2 Discussion

3.2.1 Analyze Stage

At this stage, literature and interviews were conducted which found that students had learning resources that did not accommodate their learning styles, the CBL model had never been implemented, STEAM-based learning was less emphasized and there was a lack of learning that trained numeracy literacy. So that the innovation that can be done is to develop a CBL-STEAM-based learning website with differentiated learning styles that optimizes students' numeracy literacy. This innovation is supported by several studies that are in line that the use of websites in learning has proven to be very valid and interactive as a learning medium (Irmawan et al., 2022) . In addition, other studies on website -assisted learning are very practical and very effective in obtaining high-quality education (Taqwa & Raupu, 2022). Therefore, the use of websites in learning that pays attention to the needs of students can improve students' abilities.

3.2.2 Design Stage

At this stage, the selection of the format, media, and concept of the website layout is carried out so that the website is based on STEAM integrated challenge based on differentiated learning to improve numeracy literacy. The website will be developed using a challenge based learning model combined with STEAM nuances. STEAM is integrated into every stage of CBL. The application of differentiation strategies in CBL opens up opportunities for students to learn according to their learning style. This aims to optimize the process of exploration, completion, and implementation of solutions to challenges in CBL. The website is arranged systematically based on learning objectives, learning strategies, and student characteristics to improve student numeracy literacy. The appearance of the website with appropriate fonts, colors and image sizes makes this media comfortable and easy to access. This is relevant to the benefits of the website which can support systematic learning activities even though it is not face-to-face or distance learning (Hendrawati et al ., 2021).

3.2.3 Develop Stage

At this stage, the realization of the website as an initial product will be validated by experts who aim to assess the feasibility of the content, the feasibility of the presentation, the feasibility of learning innovation, the feasibility of language and the achievement of student abilities. Based on the results of the validator's assessment, the media is in the very valid category with an average final score of 89.95%.

In terms of content feasibility, the website based on STEAM integrated with challenge based on differentiated learning obtained a final score of 89.10% with the criteria of very valid. This shows that the website that was developed has met the indicators (1) suitability of learning outcomes and learning objectives, (2) accuracy of the material, (3) website support. This website must contain the competencies that must be achieved by students. Based on the results of the content feasibility, the website based on STEAM integrated with challenge based on differentiated learning has accurate material, contains challenges and assessments that train and encourage the development of students' nuanced nuances and have a positive impact on the quality of learning. In terms of content, the application of the STEAM nuanced challenge based learning model plays an important role in the development of contextual material so that it can optimize students' nuanced nuances. This is in line with relevant research, namely that a website as a good learning medium must have strategies and support to achieve a learning goal (Irmawan et al. , 2022).

In terms of presentation feasibility, the website based on STEAM integrated with challenge based on differentiated learning obtained a final score of 89.53% with the criteria of very valid. This shows that the website developed meets (1) presentation techniques, (2) presentation support, (3) learning presentation, and (4) completeness of presentation. On the website there are images that help illustrate big ideas and bridge students to understand the material. The use of color is also an attraction of the website being developed. In addition, the nuance of STEAM provides a new learning experience to students because it is close to the elements of their lives. It can be concluded that in terms of presentation, the website based on STEAM integrated with challenge based on differentiated learning is suitable for use in learning. This is in line with previous research that websites presented with learning support, completeness, and formats that make it easy for readers and attract attention (Evalina & Aritonang, 2023).

In terms of language, the website based on STEAM integrated with challenge based on differentiated learning obtained a final score of 90% with the criteria of very valid. This shows that the website that was developed has met the indicators, namely (1) straightforward and communicative, (2) dialogic and interactive, (3) suitability of the level of development ofstudents, (4) coherence and integration of thought processes and (5) use of terms, symbols, or icons. On the website, the selection of commercial fonts increases the comfort of students in reading it. The language used on the website based on STEAM integrated with challenge based on differentiated learning has followed good and class Indonesian language rules so that it can be concluded that from a linguistic aspect it is suitable for use in learning. This is also supported by the tool in creating a website using the Canva feature which is easy to fix and arrange. In accordance with previous research, a website that has good language presentation will make it easier for users to achieve learning goals (Safitri & Mulyani, 2022) .

In terms of learning innovation, the website based on STEAM integrated challenge based on differentiated learning obtained a final score percentage of 91.66% with the criteria of very valid. This shows that the teaching materials developed have met the indicators, namely (1) novelty, (2) integration, and (3) student achievement. Learning innovation is needed to improve students' nuance literacy (Nicomse & Naibaho, 2022) . Learning must support improving students' nuance literacy because this is a skill that must be possessed in the 21st century (Rakhmawati & Mustadi, 2022). The innovation that can be developed is using the challenge based on differentiated learning model with nuances of science, technology, engineering, art and mathematics. This success cannot be separated from the role of problem-based and project-based learning supported by the implementation of STEAM science and differentiation according to students' learning styles. These innovations help students develop nuance literacy. STEAM integration can enhance the learning experience that is close to everyday life. So that in terms of student achievement, the final score is in the very valid category. It can be concluded that from the aspect of learning innovation and the aspect of student achievement, the website based on STEAM integrated challenge based on differentiated learning is suitable for use in learning.

Based on the overall validity test, the final percentage score was 89.95% with the category very valid. The results of the validity test of this research are in accordance with previous studies. Research related to the implementation of STEAM in digital learning media for children aged 5-6 years is feasible to use with 93% falling into the category of "very valid" (Hafizzaturroyani et al. , 2024). The development of digital media assisted by Google sites with differentiated learning styles that fall into the feasible category is able to improve student learning outcomes (Situmorang et al. , 2023).

3.2.4 Implementation Stage

At this stage, a response test was conducted by each of 10 students from grades VII, VIII, IX and practitioners to see the practicality of the media. Implementation was carried out using a website remotely with the direction of the researcher and then filling out a questionnaire. Based on the results of the media practicality test by students, the final score was 93.16% with the category very practical. In other words, the website based on STEAM integrated challenge based on differentiated learning helps students understand the material, has a density of ideas, linguistic accuracy, systematic presentation, and supporting presentation that suits user needs. This is supported by the role of challenge based learning as a model that brings students closer to solving global challenges. STEAM as a learning nuance also provides contextual learning experiences to students. These two are what support the improvement of students' numeracy literacy. In order to meet learning needs and increase the variety of solutions to challenges, product

differentiation according to learning styles has an impact on improving students' abilities. The presentation of website assisted learning makes distance learning efficient and trains students to learn independently.

Furthermore, the results of the response test by practitioners obtained a final score of 93.80% with the category very practical. It can be concluded that the website based on STEAM integrated with challenge based on differentiated learning is very practical to use in learning. In other words, the website based on STEAM integrated with challenge based on differentiated learning meets the language, achievement of numeracy literacy skills, learning support, and appropriate presentation. This is supported by the integration of learning innovations that support students' numeracy literacy. The integration of technology in learning also adds to the usefulness of the product. Relevant research shows that interactive website based learning media gets a response of 92% from students and 96% from practitioners and falls into the category of very practical (Safitri & Mulyani, 2022).

3.2.5 Evaluation Stage

The evaluation was conducted to revise the website based on STEAM integrated challenge based on differentiated learning. From the results of the validity test by 8 validators consisting of experts and practitioners and the results of the response test from students, this media obtained the categories very valid and very practical. So that the website based on STEAM integrated challenge based on differentiated learning to improve numeracy literacy it can be used as a learning medium.

4. Conclusion

Based on the results of the research and discussion, it was found that the website that was developed is valid and practical as a learning medium. With the description (1) the average result of the validity test from experts is 89.95% with the category very valid, (2) the average result of the response test by practitioners is 93.80% with the category very practical and (3) the average result of the student response test with a score of 93.16% with the category very practical. After the website met the research objectives, product was promoted through digital media so that it could become one of the learning resources for students.

The website development can be utilized at various levels of education. Website based on STEAM integrated challenge based on differentiated learning to improve students' numeracy literacy is an innovation in technology based learning media that prepares generations to face global challenges. This learning innovation is expected to bring real solutions to global problems and advance the country more advanced. This innovation can be a joint driving force to improve the quality of learning for all students in Indonesia. Learning that provides independent space for students can lead this country to the goal of quality education.

Based on the research that has been conducted, there are several suggestions from the research results, namely; (1) The website can be used as a learning resource or learning media to improve students' numeracy literacy, (2) it is necessary to conduct large-scale research related to the development of the website and (3) it is necessary to develop the website which is able to improve students' abilities in a wider scope.

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