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Development of Flipbook Learning Media Based on Problem Based Learning (PBL) on Acid Base Material to Increase Students Digital Literacy

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ABSTRACT

This research is part of research into the development of flipbook learning media based on problem-based learning on acid-base material to increase students' digital literacy. The aim of this research is to determine the process of developing learning media in the form of flipbooks based on Problem Based Learning (PBL) in learning acid-base material. Students' digital literacy is the main focus in this development. This research uses a Research and Development (R&D) approach with a 4D model consisting of definition, design, development and deployment. The trial was carried out at SMA Negeri 13 Jambi City. The results of this research obtained an average score from media experts of 4.75 "very appropriate" and material experts of 4.64 "very appropriate". Furthermore, based on the teacher's responses and assessments, an average score of 4.75 "very adequate" was obtained. Then it also received a very good response from students on a scale of 5 with an average score of 88.6% "very good". And for students' digital literacy skills on a scale of 5 it reached 84.4% "very good".

Keywords *Flipbook, Problem Based Learning, Digital Literacy.*

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INTRODUCTION

In the world of education, learning is an important keyword. The aim of education is to organize learning activities so that students can learn actively and maximize their potential to improve behavior, knowledge, IQ and personality. The issue of education in Indonesia is very complex, this is marked by several curriculum changes, namely the competency-based curriculum (KBK) in 2004, the education unit level curriculum (KTSP) in 2006 and the 2013 curriculum (K-13). The curriculum is one component that is very influential in the learning process. The objectives of curriculum development are closely related to the direction and targets that must be achieved by every educational initiative. The curriculum aims to develop students' character, including values, ethics and leadership. To achieve this, teachers must use varied teaching

approaches compared to previous teaching approaches to attract students' attention rather than relying on printed books (Akhiruddin et al., 2019).

In the 21st century education system, teachers must utilize technology as a method of learning innovation. The world of education not only faces technological advances, but also many problems in preparing superior and competitive human resources for a society that continues to develop. To be competitive in the era of globalization, the quality of human resources must be improved. The teaching and learning process of students based on the educational program determines the achievement of educational goals (Saputri et al., 2021).

One of the 21st century learning that requires technology as a support in the learning process is chemistry subjects. Chemistry is a branch of science that studies materials, structure, energy, properties and reaction changes. The goal of studying chemistry is to gain understanding in everything related to facts, have problem solving skills, master laboratory learning, and have a scientific view of life are the goals of studying chemistry (Putri & Muhtadi, 2018).

Based on the results of interviews with chemistry teachers at SMA Negeri 13 Jambi City, information was obtained that the learning media currently used is printed books. It seems that the use of media used in the chemistry learning process is still very small, causing the learning process to become one-way and students are less interested in participating in learning, especially in chemistry subjects.

It is known that a lack of understanding of chemistry subjects in the teaching and learning process causes students' learning outcomes to be worse. The ability to listen, take notes and write is very important for students' understanding of learning. However, students do not understand the material taught by the teacher and cannot use their digital abilities to find learning resources that they can use during the learning process. When they have learning difficulties, they tend to use google and chrome to search for literature.

The low level of digital literacy knowledge makes it difficult for students to understand chemistry subjects, especially acid-base material, and it is difficult to relate it to everyday life. Based on this, learning media is needed that attracts students' attention in learning in order to improve process skills in learning, especially in understanding chemical material.

Based on the results of the researcher's interviews, there are several things that need to be developed to support teachers and students in the teaching and learning process in order to achieve learning goals. Teaching materials that are suitable to be developed to keep up with technological developments are

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flipbook learning media. By utilizing technology, researchers also hope to increase students' digital literacy.

RESULT AND METHODE

This research is part of the development research category which uses qualitative and quantitative approaches. To develop this research tool, a 4D Research and Development (R&D) research design was used. In research and development, 4D models are the right choice because they are easier, more organized, and widely used to create effective learning programs and products. Test subjects in this research is a class XII F3 Saintek student at SMA Negeri 13 Jambi City. The quantitative data obtained is in the form of an assessment of the product development obtained from material experts, media experts, teacher response questionnaires and student response questionnaires, analyzed and processed descriptively into interval data using a likert scale.

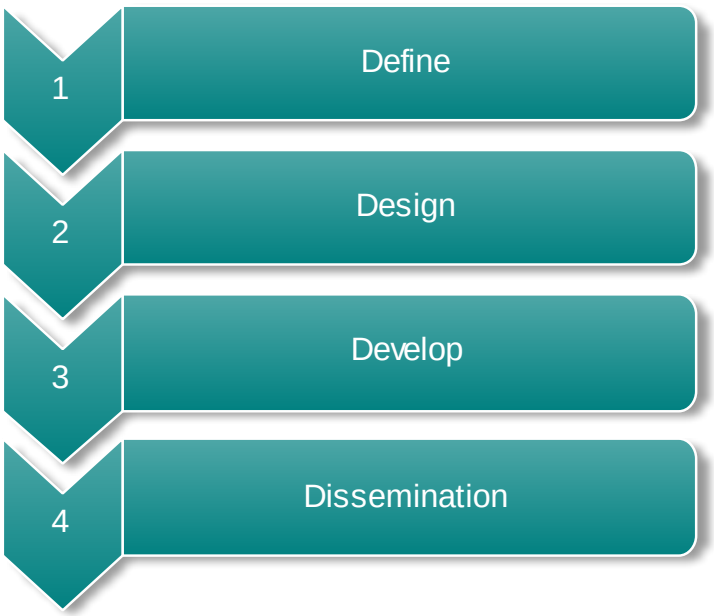

Figure 1. Research Stage

The data analysis technique used to determine the suitability of learning media is using a validation sheet. To determine the validation value from experts and users with the formula:

$$Rata - Rata\ Skor = \frac{Jumlah\ Skor}{Jumlah\ Butir} \times 100\%$$

The total validation value is referred to the expert and user validation criteria as follows:

Table 1. Interpretation of Expert Validation Scores With a Likert Scale

Presentase	Kriteria
0%-20%	Sangat Tidak Layak
20%-40%	Tidak Layak
40%-60%	Kurang Layak
60%-80%	Layak
80%-100%	Sangat Layak

(Mardiana & Harti, 2022)

Analysis of teacher assessment questionnaire data was carried out using a likert scale with 5 scales. The five scales used are as follows: Sangat Tidak Baik (STB), Tidak Baik (TB), Kurang Baik (KB), Baik (B), Sangat Baik (SB).

Table 2. Teacher Assessment Criteria

Rata-Rata Skor Jawaban	Kriteria
1,0 - 1,8	Sangat Tidak Baik
>1,8 - 2,6	Tidak Baik
>2,6 – 3,4	Kurang Baik
>3,4 – 4,2	Baik
>4,2 – 5,0	Sangat Baik

(Widoyoko, 2012)

Then, to determine the increase in students' digital literacy, look at the test results (pretest-posttest) tested using the N-Gain test.

$$< N - Gain > \frac{skor\ posttest - skor\ pretest}{skor\ maksimum - skor\ pretest}$$

The N-gain value obtained from each student is then categorized using the implementation of the N-gain index as shown in Table 3. below.

Table 3. Indeks N-Gain

Skor N-Gain	Interpretasi
0,70 <g> <100	Tinggi
0,30 <g> <0,70	Sedang

0,00 <g> <0,30	Rendah

(Supriadi, 2021)

RESULT AND DISCUSSION

The final result of this research and development is in the form of flipbook learning media based on problem based learning (PBL). This media is presented in flipbook form with a 4D development model on acid-base material. The 4D stages consist of define, design, develop, disseminate. The resulting product can be accessed via smartphone/cellphone, laptop or computer which can be accessed anytime and anywhere which can make it easier for users to access this flipbook learning media.

In the definition stage, this is done to determine the needs in the learning process and students' learning styles, so that researchers can collect accurate data. This stage is divided into several steps, namely initial analysis, student analysis, concept analysis, task analysis and goal specification.

The initial analysis stage in this development research was observation in the form of an interview with one of the chemistry teachers at SMA Negeri 13 Jambi City. This observation was carried out with the aim of obtaining an overview of the situation and conditions in the learning and teaching process at school, thereby supporting the need to develop media for chemistry learning. As well as distributing student needs questionnaires.

Next, analyze the students, this analysis stage was carried out to determine the characteristics of students regarding the level of understanding possessed by students at SMA Negeri 13 Jambi City. This analysis was carried out by distributing questionnaires to 35 students in class XII F3 Science and Technology at SMA Negeri 13 Jambi City. This was done to strengthen the data obtained regarding the problems faced by teachers and students at school. Based on the results of the student needs questionnaire, it was obtained that a percentage of 62.9% of students stated that they experienced learning difficulties, especially in learning chemistry, especially in acid-base material.

Then concept analysis, in this analysis stage, the researcher identified a concept of learning material that would be taught to students in acid and base material through the flow of learning objectives. Then analyze the task, task analysis in this analysis, the tasks given to students must be considered based on the students' abilities. The aim of giving this assignment is to measure students' understanding of the acid-base material given. The last is the specification of learning objectives, analysis of learning objectives is carried out in accordance with the curriculum used at SMA Negeri 13 Jambi City, namely

the Merdeka Curriculum which has been used since 2022 for phase E and 2023 for Phase F.

The second stage is design. This design stage aims to be able to design learning tools that will be developed into a complete form of flipbook learning media. Media selection In selecting the media, the researcher chose media that was suited to the research objectives, namely the development of flipbook learning media based on problem based learning on acid-base material. Flipbooks were chosen because they adapt to students' needs and developments in the era of globalization by using technology and flipbooks can be used on smartphones/cellphones, laptops or computers with the existing instructions for use. Format Selection, The researcher chose the format in the media to attract more students' attention and motivate students to read it comfortably and clearly. This flipbook was created by choosing attractive colors and the type and size of writing that suits the media as well as acid-base learning videos and practice questions in it. This media was created based on Mayer's 12 principles. Initial Design, In designing this flipbook learning media, development must first create a design or what is called a flowchart, so that the development flow is clearly depicted and becomes a benchmark during the development process, as well as the arrangement of pages and materials that are made in accordance with the sequence and well arranged. Making Storyboards In making this storyboard, it was designed based on a flowchart as an initial design for the problem based learning flipbook learning media that was developed. Aims to determine the components on each page consisting of text, images and button positions in the flipbook learning media. Evaluation Plan In this research, a pre-test and post-test were carried out to see students' understanding of acid-base material and digital literacy. The initial test and final test are carried out by answering 4 different essay questions. So that after seeing the initial results and final test results, researchers can find out the differences before using the media and after using the media based on students' digital literacy abilities towards the media that has been developed.

At the development stage, the researcher realized the results of the storyboard form that had previously been designed, then the product produced was flipbook learning media based on problem based learning on acid base material. In the product creation process, researchers chose the Canva application as an application that helps in the development process. Canva is an online graphic design tool that is free to use and also provides a variety of design examples to use. The finished product is then validated by a team of validators, namely media experts and material experts.

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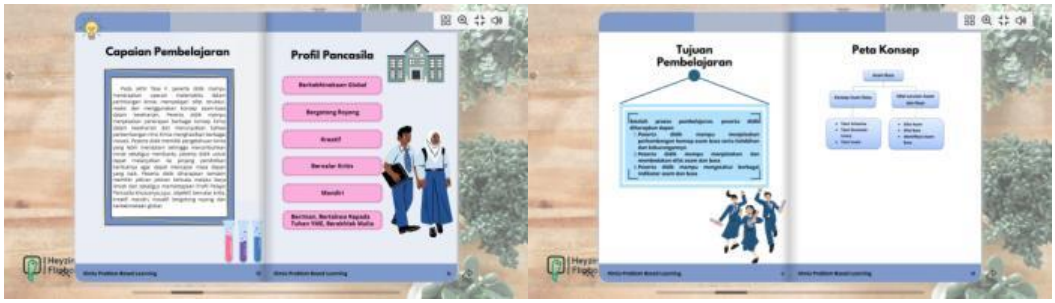
(a) (b)

Picture 2. Front Cover Page (a) Foreword and Table of Contents (b)



(a) (b)

Picture 3. Pancasila Student Profile and Learning Achievements Page (a) Learning Objectives Page and Concept Map (b)

(a) (b)

Picture 4. Instructions for Use Page and Materials Page (a) Learning Video Page (b)

(a) (b)

Picture 5. Practice Questions and Group Discussion Page (a) Learning Flashback Page and Bibliography (b)

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(a) (b)

Picture 6. Developer Profil Page (a) Back Cover Page (b)

The finished product is then validated by a team of validators, namely media experts and material experts. This validation is carried out to determine the feasibility of the product being made before it is implemented or tested. Products that have been validated by experts will receive comments and suggestions for improvement. The instrument used was a validation questionnaire for media experts and material experts. Before entering the media validation stage, the researcher first consulted with the supervisor who produced draft I. After the media was declared appropriate, the next step was to validate with media experts who produced draft II. The validation questionnaire sheet is presented in the form of an attitude statement using a 5-score Likert scale assessment score, namely 5 (Very Good), score 4 (Good), score 3 (Not Good), score 2 (Not Good), and score 1 (Very Bad).). From the results of the first media expert validation, a total score of 77 was obtained, with an average of 3.8, which was in the "decent" category with revised notes suggested by media experts. For the second media expert validation, a total of 95 was obtained, with an average of 4.7 in the "very appropriate" category.

After media validation is complete, next is material expert validation. The results obtained from this validation are data in qualitative form, namely in the form of comments and suggestions for improvement from the validator which are then used to improve the media, and quantitative data in the form of scores obtained from each question. The purpose of validating this material is to ensure that the design that has been created is suitable for testing in classroom learning with the aim of achieving the learning objectives. From the results of the material expert validation as a whole, good comments and suggestions were obtained regarding the product assessment criteria, apart from that, a total score of 65 was obtained with a mean of 4.64 and was in the interval >4.2 - 5.0 in the "very feasible" category and was acceptable. The following are the validation results from media experts and material experts on problem based learning flipbook learning media.

Table 4. Validation Result

Aspek	Rerata Skor	Category
Media	4,75	Sangat Layak
Materi	4,64	Sangat Layak

After validation of the media and materials was complete, the researchers asked for assessments and responses from chemistry teachers at SMA Negeri 13 Jambi City regarding the flipbook learning media based on problem based learning that had been designed. Based on the results of the teacher's assessment of the learning media, there were no changes from the previous product which had been validated by the validator, because the teacher felt that the flipbook learning media based on problem based learning that was developed was very good and worthy of being tried out. Analysis of the quantitative was carried out by determining the verification classification obtained from the teacher based on the answer score, namely 95 in the "very good" category because it is in the class interval >4.2 - 5.0. From these results it can be concluded that the media developed is "very good" and worthy of being tested in large groups.

At the distribution stage, it was limited to schools that were used as research locations and for research purposes. This stage was carried out by distributing flipbook learning media on acid-base material to students as additional media for learning chemistry, especially on acid-base material.

Next, a large group trial was carried out on 35 XII F3 Saintek students at SMA Negeri 13 Jambi City. Based on the results of students' responses to flipbook learning media based on problem based learning on acid base material, a score of 1552 was obtained with a percentage of answers from all respondents of 88.6% which was in the interval and included in the very good category. Therefore, from data obtained from the assessments of educators and student respondents. It can be concluded that the flipbook learning media based on problem based learning developed by researchers is categorized as very good for use in the learning process both at home and at school.

To see the development of students in digital literacy skills using the flipbook learning media based on problem based learning that has been developed. The developer also provided several questions regarding students' digital literacy skills which were filled in by 35 students. The results of the questionnaire on digital literacy skills showed that 84.4% of students had improved and entered the percentage of 81%-100% with the "very good" criteria. This increase is also measured through pretest and posttest scores on

students' digital literacy skills. By using the normalization test, the N-gain test results data can be seen in the table 4.

Table 5. Pretest-Posttest N-Gain Test Result

Learning Model	N-Gain Score	Category	N-Gain Persen (%)	Category
Problem Based Learning	0,98	Tinggi	98%	Sangat Efektif

Based on the results obtained from the N-gain test, it can be seen that the average N-gain value of 98% is included in the very effective category.

CONCLUSION

Based on the research results, it was concluded that the flipbook learning media was based on problem based learning on acid-base material to increase students' digital literacy. Using 4D which consists of define, design, development, and disseminate. The feasibility process for learning media gets a very suitable category based on expert assessments, so that the product can be used. Based on the results of the students' responses, they received an average with very good criteria through distributing questionnaires, so that from these results the product can be used as a tool in the learning process.

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