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Development of Learning Media Based on Heyzine Flipbook in The Subject of Lathe Machining Techniques Class XI at SMK Kemala Bhayangkari 1 Jakarta

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Abstract. *This research aims to develop and test the feasibility of products in the form of heyzine flipbook-based learning media in the subject of Lathe Machining Engineering class XI at SMK Kemala Bhayangkari 1 Jakarta. This learning media was developed using the R&D (Research and Development) method using a 4D model consisting of define, design, develop, and disseminate. In the process of assessing the feasibility of this learning media, it provides a validation assessment questionnaire instrument to material experts, media experts, and media feasibility tests to students in grade XI of Machining Engineering as respondents. Learning media is validated by experts with a score of 100% for the material aspect, 94% for the media aspect. And for the results of the feasibility trial, the learning media got a score of 91% of the results of the trial of 53 students. From the results of the test, it can be concluded that the heyzine flipbook-based learning media in the Lathe Machining Engineering class XI subject at SMK Kemala Bhayangkari 1 Jakarta is "Very Feasible" to be used for Lathe Machining Engineering learning activities. The focus of this study is at the stage of development and feasibility testing of the developed media only, as for the results of this study, there are several recommendations that can be given, including the following, heyzine flipbook-based learning media can be implemented and utilized optimally in the learning process of Lathe Machining Engineering at SMK Kemala Bhayangkari 1 Jakarta and other schools where there are Lathe Machining Engineering subjects. And heyzine flipbook-based learning media in the subject of Lathe Machining Engineering needs to be further researched such as the effectiveness of heyzine flipbook-based learning media in the subject of Lathe Machining Engineering.*

Keywords: *Learning Media, Heyzine, Flipbook, Lathe Machining Engineering*

1. BACKGROUND

SMK Kemala Bhayangkari 1 Jakarta is one of the private schools in Jakarta, is one of the Vocational High Schools (SMK) with a vision to become skilled and superior personnel, have noble character and global insight. (Bhayangkari, 2024). In achieving this vision, SMK Kemala Bhayangkari 1 Jakarta organizes several expertise competencies, one of which is Machining Engineering. Because in vocational or vocational education, the priority is to prepare students to face the job market and develop expertise in the business world and the industrial world professionally.

One of the subjects that must be studied by students in the competency of Mechanical Engineering expertise during their education at SMK Kemala Bhayangkari 1 Jakarta is the Lathe Machining Technique subject. In learning Lathe Machining Techniques, students are taught about the knowledge and ability to use lathe machines safely and correctly. The business world and industry want SMK students to be proficient in operating lathes because they are

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very familiar tools in the business and industrial world that can produce a variety of products. (Hamdi et al., 2022).

The educational process cannot be separated from the learning and teaching process, therefore, the learning process requires good communication between the sender and receiver of the message. It is a two-way communication that is interrelated. The existence of learning media is indispensable in the form of two-way learning communication (Setiyo et al., 2018).

According to Tafonao (2018)According to Tafonao (2018), student focus in using learning media as an introduction to educational modules and instructional aids for teachers can improve the learning process. It will be more effective and efficient to use learning media in the teaching and learning process. In addition, learning media can overcome boredom in the learning process. Teachers must be able to provide motivation. Educators' goals will be met if these resources are used effectively. Teaching materials are other sources that can help the implementation of the learning process in addition to learning media. Teaching materials can facilitate the learning process, such as books, sound recordings, images, or videos that can be downloaded through the youtube application. This leads to a world of education that demands innovation that is comparable to the advancement of science and technology without ignoring human values. (E. Wibowo & Pratiwi, 2018).

Based on observations made by researchers in February 2024, through interviews with teachers of Lathe Machining Technique class XI SMK Kemala Bhayangkari 1 Jakarta, problems were obtained, namely the teacher when providing learning material, still using learning media in the form of *powerpoint* media and printed books as a tool in the learning process, sometimes not even all meetings use *powerpoint* media, namely by listening to explanations made by the teacher in front of the class so that students are less enthusiastic in paying attention to the explanations given by the teacher, and there are still many students who are cool with their respective *gadgets*.

Since printed books are usually thick and heavy, students find reading less interesting. Learners like learning resources that are practical and efficient. This learning resource is considered impractical because students cannot use it at any time (N. F. Putri, 2018). (N. F. Putri, 2018). Learning media needs innovation to keep up with the development of scientific and technological advances and facilitate student learning in accordance with the curriculum at school, modern education requires innovation. Teachers use *information technology* (IT) in Lathe Machining Engineering classes by using learning media in the form of *power point slides* which according to students are less interesting, therefore students need learning media that they find easier to understand and interesting, and can be accessed anytime and anywhere. So

that learning is easier, fun, effective, and efficient. The more developed times tend to utilize *information technology* in all fields, for example, the use of flipbook learning media in learning.

Based on the above problems, the media is an important component in the learning process that helps achieve learning goals. (Ghani, 2023). The use of learning media during the learning process can have a positive impact on students' psychology. It can also enhance and motivate them to learn (Dewi & Handayani, 2021). (Dewi & Handayani, 2021). Learning media according to Mashuri (2019) is something that channels subject matter, stimulates students' thoughts, feelings, interests, and attention. Thus, learning media can make the teaching and learning process more effective and efficient, and can also create a strong bond between teachers and students. Media can also help reduce boredom during the learning process. Therefore, educators must have the ability to provide motivation through resources that exist inside and outside the classroom, provided that these resources are used properly to achieve the educator's goals. That way students need flipbook learning media to overcome problems in the learning process.

According to Masrifa et al. (2023) flipbook media has advantages compared to other learning media, namely students will not feel bored because they have a lot of experience with the flipbook learning media used and can access it on their cellphones and laptops. According to Endaryati et al. (2021) flipbook*s* have multimedia properties that can be combined with text, narration, video, practice questions, and integration with different approaches in the implementation of learning. Therefore, the interactivity element of the flipbook can be an added value to support learning activities. It can be concluded that a flipbook is a systematically organized media that contains material in the form of text, objects, and sound which is then presented in a *digital* format which has multimedia elements in it so that it makes users more interactive with the media. Heyzine is an application for creating flipbook learning media in the form of a website. Media created using the Heyzine application can be a flipbook in HTML format, which is accessed via smartphone, laptop or computer. (Qouri & Zulherman, 2023).

In research conducted by Sari & Ahmad (2021) the development of *digital* flipbook learning media for social studies subjects on the beautiful diversity in my country has a positive impact to be used as a means or learning media in the teaching and learning process, in line with the results of research by Sari & Ahmad (2021). Susilawati (2021) Then in research Adiatma & Thana (2022) stated that the advantage of this flipbook-*based* interactive *digital* module is that it can be accessed anytime and anywhere, it is hoped that it will be able to help students. Results from research Sa'diyah Kalimatus (2021) stated that the media developed is feasible to be used as a learning support as well as to attract students' enthusiasm. Meanwhile,

the research conducted by Meidita & Susilowibowo (2021) in line with Anandari et al. (2019) concluded that the results of the development of flipbook media were declared feasible to arouse learning motivation and reduce the level of boredom in the learning process.

Based on the background description above, this study aims todevelop learning media based on heyzine flipbook in the XI grade Lathe Machining Technique subject at SMK Kemala Bhayangkari 1 Jakarta, and to determine the feasibility of the product. This research was designed with *Research and Development (R&D)* research and development with the *Four-D (4D)* development model which contains 4 stages, namely, *Define* (defining stage), *Design (design* stage), *Develop* (development stage), and *Disseminate* (dissemination stage) The selection of this model was carried out because the presentation of the 4D learning model is simple and easy to understand. (Jannah et al., 2023)..

2. THEORETICAL STUDY

- ***Research and Developmet*** **(R&D)**

Borg & Gall state that research and development is used to develop and validate products. The product function includes not only tangible items such as computer *software*, learning films, and textbooks, but also techniques such as teaching techniques and educational programs. (Sugiyono, 2015). Sugiyono (2015) says research and development serves to validate and develop products. When a product is validated, it indicates that it is already in use, and researchers are only testing its effectiveness or validity. In a broader sense, developing products can involve producing new products that have never been made before or improving current products to make them more useful, efficient, and effective.

Sugiyono (2015) said in his book entitled *Research* and *Development* methods, research and development methods can be interpreted as a scientific way to research, design, produce, and test the validity of products that have been produced. Research and development is often called a "bridge" between *basic research* and *applied research*.

For needs analysis research so that hypothetical products can be produced as *basic* research methods are used. Furthermore, to test the hypothetical product, experiments are used. After the product is tested, it can be applied. The process of testing products with these experiments is called applied *research*. (Sugiyono, 2015). R&D as a bridge between basic and applied research can be described as Figure 1.

Figure 1. Research and Development is a "Bridge" between *Basic Research* and *Applied* Research (Sugiyono, 2015)

- **Borg & Gall Development Model**

Borg & Gall suggested that there are 10 implementation processes in the Borg and Gall development model, this model has relatively long stages: (1) *research* and *information* gathering, (2) *planning*, (3) developing a draft product (*develop preliminary form of product*), (4) preliminary field testing, (5) refining the initial product (*main product revision*), (6) *main field testing*, (7) refining the field test product (*operational product revision*), (8) *operational field testing*, (9) *final* product revision, and (10) *dissemination* and implementation. (Sugiyono, 2015).

Based on the Borg & Gall development model, the development procedure in this study was carried out in steps as shown in Figure 2:

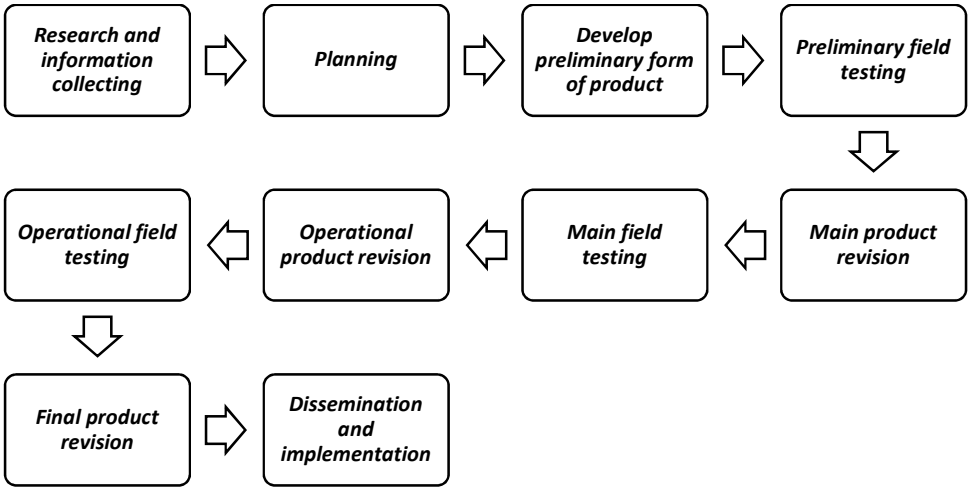


Figure 2: Steps of Research and Development According to Borg & Gall (Sugiyono, 2015)

There are advantages and disadvantages to Borg & Gall development. The advantage of this model is that it can provide products with high validation value, which promotes continuous product innovation. On the other hand, the weakness of this model is that it takes a long time because the method is realistically difficult and requires a large source of funding. (Maydiantoro, 2021).

- **ADDIE Model**

According to Dick et al. (2005) in Maydiantor (2021) developed a development model, namely the ADDIE model, the model consists of five stages of development. The ADDIE stages are as shown in Figure 3.

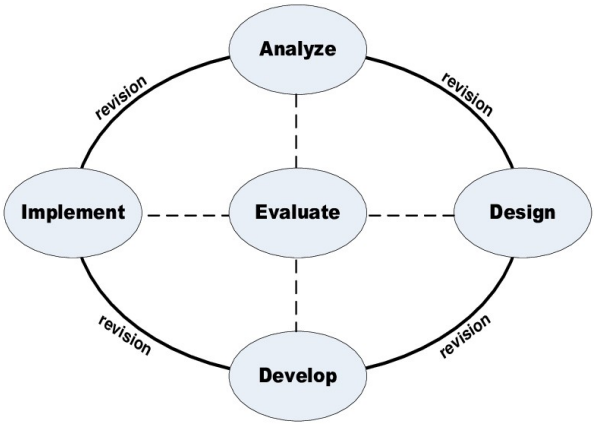


Figure 3. ADDIE steps of development (Maydiantoro, 2021)

The model involves a five-phase development model including: *Analysis, Design, Development or Production, Implementation or Delivery* and *Evaluations.*

- **4D Development Model**

Thiagarajan (1974) suggests the steps of research and development consist of four stages of development. The first stage is Define or the needs analysis stage, the second stage is *Design,* which prepares a conceptual framework for learning models and devices, then the third stage is *Develop*, which is the development stage involving validation testing or assessing the feasibility of the media, and the last is the *Disseminate* stage, which is the implementation on the real target, namely the research subject. (Maydiantoro, 2021). The steps of research and development according to Thiagarajan can be seen in Figure 4.

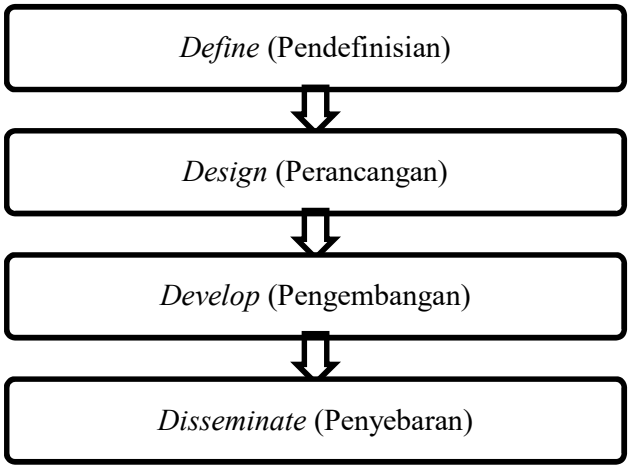


Figure 4. Four-D Development Steps (Maydiantoro, 2021)

- **Learning Media**

Hasan et al. (2021) suggested that one of the tools that educators use to carry out learning activities effectively is learning media. Anything that can be used to transmit information from one person to another is considered media, by attracting students' interest and moving their thoughts, feelings, and attention, media helps facilitate learning. Any tangible physical device that can convey a message and encourage student learning is considered a medium. In terms of communication, one of the elements of strategy in learning is the use of media as a distributor of messages sent to the target or recipient of the message and the material sent is a learning message, what you want to achieve is the learning process. This makes it clear that learning media is a tool used by teachers to help the learning process run smoothly and attract students' interest in learning. (Hasan et al., 2021)

Media selection is the process of sorting out which teaching materials are suitable for the message or information to be conveyed. The selection of learning media is based on a number of established principles, including productivity, relevance, and efficiency. (Zahwa & Syafi'i, 2022).. According to Miftah & Nur Rokhman (2022) media selection criteria, namely: 1) the instructional objectives to be achieved; 2) the characteristics of the learners; 3) the desired type of learning media stimuli (audio and visual), the background or environment, and motion or still, 4) the availability of local resources, 5) whether the media is ready to use, or media design, 6) practicality and durability of the media, 7) long-term cost effectiveness.

- **Flipbook Media**

According to M. H. Wibowo (2019) flipbook is a collection of images or a combination of photos that resemble a book that creates a motion display. Flipbook*s* are intended to display

animation, but are currently designed and developed by experts to produce a variety of sophisticated applications, including books, comics, magazines, and more.

Flipbook*s* contain various images on each page. If you open each one individually, it will appear as if you are opening a book. The appearance of the flipbook is really attractive, and students' understanding of the learning material can be improved by using simple language. (Candra Eka Setiawan et al., 2020). In the current development, the use of flipbook learning media is very appropriate, so that learning becomes more fun.

- **Advantages of Flipbook Media**

  Flipbook media has several advantages in its use for learning media which include:

  a. Able to make educational materials as interesting as possible for learners by using words, sentences, pictures and colors that they find more interesting.
  b. It can be combined with pictures, music and videos to make it easy for learners to understand.
  c. Easy to make, cheap, and easy to carry around.
  d. As well as being able to create variations in learning so as not to cause boredom in students (Setiadi et al., 2021).

- **Disadvantages of Flipbook Media**

  The disadvantages of flipbook*s* as learning media are:

  a. Dependence on electricity resources.
  b. It can only be accessed *online*, and must have an internet network.

- **Heyzine Flipbook App**

Heyzine flipbook is an application *software* that can create flipbook*s* capable of displaying moving animation effects, videos, photos, and links in its design, which enhances the interactive nature of learning. Visual, audio, and video content can be accessed through electronic book learning content through a web browser. (Erawati et al., 2022). The heyzine application creates media in the form of flipbook*s* in the form of HTML which can be opened via cellphones, tablets, Android, and PCs. Media can also be downloaded to be applied in digital or printed form (Erawati et al., 2022). (Erawati et al., 2022).. Heyzine allows students to read as if they were physically opening a book because it contains animated features that simulate the feeling of physically turning pages and includes sound effects to mimic the turning of paper in a book (Saraswati et al., 2022). (Saraswati et al., 2021).

3. RESEARCH METHODS

The development of learning media based on heyzine flipbook in class XI Lathe Machining Engineering subjects at SMK Kemala Bhayangkari 1 Jakarta was developed using research and *development* (R&D) methods. According to Sugiyono (2022) research and development methods can be interpreted as a scientific way to research, design, produce and test the validity of the products produced. The development method in this study adopted the 4D model by Thiagrajan, Semmel, and Semmel (1974) with the stages of *define, design, development,* and *dessiminate.* The 4D model was chosen because according to Mulyatiningsih (2011) in Hendriana & Hartono (2021) the 4D model can be used to research and develop teaching materials such as modules, worksheets, textbooks, and media. In line with this according to Fattah et al. (2020) each step of the development process is ideal for developing and producing products in the form of modules.

Because this flipbook is used for lathe machining technique subjects, the development process in this study uses the 4D model, because each stage of the 4D development model process is clear, detailed, and sequential, making it easier for developers to be guided in producing learning media in the form of flipbook*s.* Flipbook*s* are made using heyzine flipbook *maker software* to combine writing with *audio*, *video*, and images. In addition, it also uses Canva software to create covers, and other animations in the flipbook. The process was made using an Asus laptop type TUF A15, *gadgets*, and books as a reference source. The data collection technique in this study was to make observations, interviews, documentation studies, and questionnaires . Data obtained from expert lecturers and respondents are then calculated to answer the formulation of research problems. There are 2 data analysis, namely qualitative and quantitative.

4. RESULTS AND DISCUSSION

1. Product Development Results

This development produces a product in the form of a flipbook by packing material on lathe machining cutting parameters, lathe work preparation, and turning for certain types that can be used as learning media in Lathe Machining Engineering subjects. This development uses the *research and development* (R&D) method with the 4D model which consists of 4 stages, namely the *define, design*, *development*, and *disseminate* stages. The following is an explanation of the stages of developing learning media based on heyzine flipbook in the subject of Class XI Lathe Machining Techniques at SMK Kemala Bhayangkari 1 Jakarta.

a. *Define* Results

At this stage, the initial stage is observation to be able to identify problems related to deficiencies in the learning process related to the product being developed. At this stage there are three steps, namely:

1) Initial Analysis Results

The results of the initial analysis that researchers found after conducting observational interviews with one of the Lathe Machining Technique subject teachers at SMK Kemala Bhayangkari 1 Jakarta obtained the results that learning media is needed that is interesting, creative, and innovative, can be accessed anytime and anywhere, and can increase interest in learning and increase student independence in learning. After obtaining the data from the initial analysis, the next stage is to identify the problems found in learning the subject of Lathe Machining Technique.

Based on the results of observations of researchers' interviews with Lathe Machining Technique subject teachers conducted at SMK Kemala Bhayangkari 1 Jakarta, information was obtained that in the learning process the delivery of learning materials was still focused on teachers who used limited learning media, namely *power point* media and printed books, and not every meeting used *power point* learning media, but used the lecture method. So that students are less enthusiastic in paying attention to the explanations given by the teacher, and there are still many students who are cool with their respective *gadgets*. Therefore, learning media is needed that is in accordance with the needs of the field that can increase interest in learning, and increase student independence in learning, and can be accessed anytime and anywhere.

2) Concept Analysis Result

The results of this concept analysis are adjusted to the material that refers to the flow of learning objectives. So as to produce the content of the material that will be presented on the learning media to be developed.

3) Learning Objective Formulation Results

The preparation of these learning objectives has been formulated based on the learning achievement indicators listed in the flow of learning objectives as in table 1.

Table 1. Flow of Learning Objectives

Elements	Learning Outcomes	Learning Objectives	Learning Objective Flow
Lathe Machining Technique	At the end of phase F, learners are expected to be able to understand the cutting parameters of lathe work; analyze turning speed, cutting speed, feeding and lathe machining time;	Understand the cutting parameters of lathe work. Analyze the rotating speed, cutting speed,	1. Understand the cutting parameters of lathe work. 2. Analyze the rotating speed,

Elements	Learning Outcomes	Learning Objectives	Learning Objective Flow
	and understand lathe work preparation, turning for certain types of work.	feeding and machining time of a lathe. Understand lathe job preparation. Understand	cutting speed, feeding and machining time of the lathe.
			3. Understand lathe work preparation.
			4. Understand turning for specific types of work

b. *Design* Results

After doing the defining stage to find out the problem, the next stage is the design stage which consists of:

1) Media Selection Results

Based on the results of interviews and observations that researchers have conducted at the *defining* stage, the problem is that in delivering learning materials, they still use limited media, namely *power point* learning media, and also printed books, and not every meeting uses *power point* learning media. So that students are less enthusiastic in paying attention to the explanations given by the teacher, and there are still many students who are cool with their respective *gadgets*. Therefore, learning media is needed that is in accordance with the needs of the field that can increase interest in learning, and increase student independence in learning, and learning media can be accessed anytime and anywhere.

Based on this, heyzine flipbook-*based* learning media was chosen because flipbook learning media can be accessed using *cellphones* or devices and can be used anytime, and anywhere. In addition, heyzine flipbook-*based* learning media has the advantage of being able to load images, audio, test *links*, and videos so that it is more interactive and detailed.

2) Format Selection Result

After conducting the concept analysis stage, the material that will be presented on the learning media is obtained, namely, lathe machining cutting parameters, lathe work preparation, and types of turning work. The problem found in the field is that the learning media used by students are *power points*, and printed books. The learning media has several shortcomings. In printed book learning media has shortcomings, namely illustrations that are less detailed and there are no learning videos, which help students understand Lathe Machining Technique material. Not even all meetings use *power point* learning media.

Another problem in the classroom in the Lathe Machining Technique subject is that the learning atmosphere in the classroom is sometimes less conducive so students need learning

media that can be accessed independently. Based on these problems, the format chosen is HTML because HTML can be accessed using a *mobile phone* or device and can adjust the *layout* depending on the type of *mobile phone* or device used. The HTML format was also chosen in order to help and facilitate students in learning in the classroom or learning independently. Heyzine flipbook-*based* learning media in the Lathe Machining Technique subject has the advantage that it can be accessed easily and contains the Lathe Machining Technique material needed by students in detail and completely based on the results of the needs, so that students can learn as a whole because the learning media is loaded with images, audio, test *links*, and videos that are presented have been made sequentially.

3) Initial Design Results

At the stage of designing heyzine flipbook-*based* learning media in Lathe Machining Technique subjects, researchers began designing by making an Outline of Media Content (GBIM), Description of Material (JM), *story board of the* developed media. After compiling GBIM, JM and *story board* researchers began to make media, here is how the media was made:

a. Taking documentation related to the material in the Lathe Machining Technique subject.
b. Creating a *cover* for the media display. The *editing* stage is done using the canva application and using a laptop.
c. Making exercise questions to complement the media, the grids that have been compiled in making the material are used as a reference in making questions as material for evaluating students. Exercise questions are made using *google form*.
d. Recorded the sound for the material "understanding of OHS" in the lathe work preparation material. Audio was recorded using a *cellphone*.

Figure 5. Sound Recording Process

e. The materials, photos, *covers*, which have been made are put together using the canva application, and redesigned, then *copied* into the heyzine flipbook *maker* application.

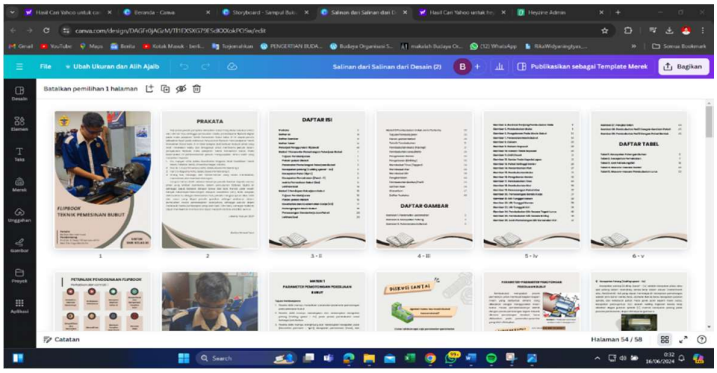
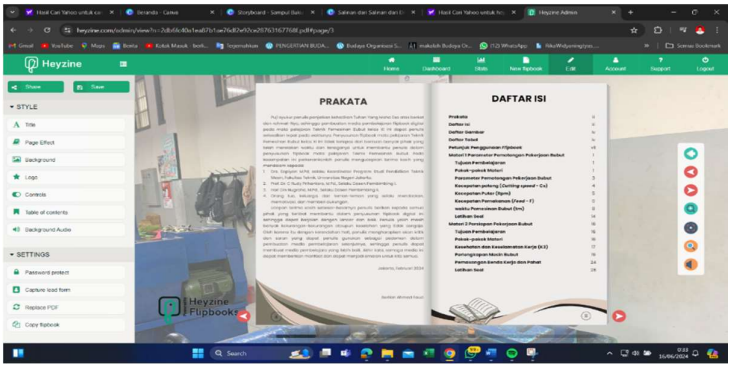
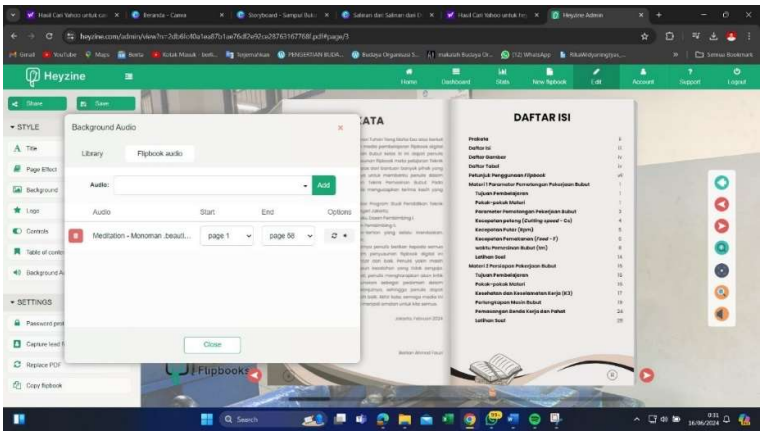


Figure 6: Merging Process Using Canva Application

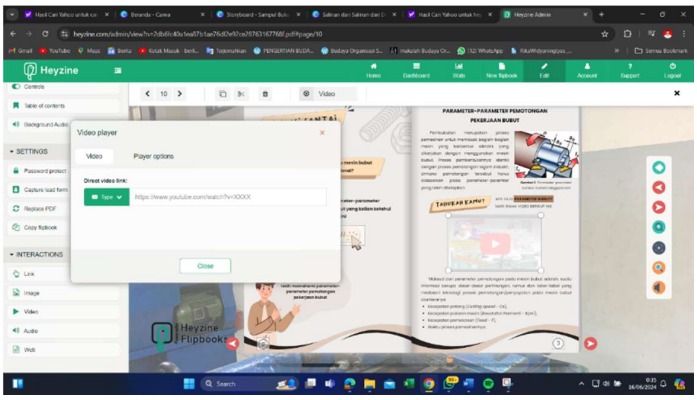
f. Make a flipbook using the heyzine flipbook *maker* application. Lathe Machining Technique material that has been compiled in the canva application will be converted into a flipbook using this application.



Flipbook Creation Process



Flipbook *Backsound* Input Process



Learning Video Input Process on Flipbook

After editing and inputting has been done, the next step is to export the file into HTML format, so that it can be accessed using the WEB and the learning media can be opened *online*.

c. *Development* Results

After carrying out the design stage of developing heyzine flipbook-*based* learning media, researchers conducted product validity testing on material experts, media experts, and media feasibility tests for students. The validation measuring instrument is a non-test instrument using a *Likert* scale. Material expert validation was carried out by the Bubtu Peemesinan Engineering subject teacher at SMK Kemala Bhayangkari 1 Jakarta, and for material expert validation carried out by a Lecturer in the Mechanical Engineering Education Study Program at the State University of Jakarta.

1) Material Expert Validation Results

Material expert validation was carried out by the Lathe Machining Engineering subject teacher of SMK Kemala Bhayangkari 1 Jakarta, namely Mr. Fajar Kusuma, S.Pd., the following are the results of material expert validation:

Table 2: Material Expert Validation Results

No.	Indicator Statement	Score	Interpretation
Aspects of Correctness of Material Concepts			
1.	The learning media manages the material according to the subject's ATP.	5	Very good
2.	Learning media presents material in accordance with learning outcomes.	5	Very good
3.	Learning media has coherent / systematic material content.	5	Very good
Material Aspects			
4.	Learning media has material accuracy in accordance with the theory taught.	5	Very good
5.	The actuality of the material presented in the Lathe Machining Technique learning media.	5	Very good
6.	The material provided in the learning media is in accordance with the theory taught.	5	Very good
7.	Learning media contains material content that is in accordance with the learning objectives.	5	Very good
8.	There are examples in the learning media that support the clarity of the material.	5	Very good
9.	Learning media provides attractiveness in conveying material content.	5	Very good
10.	The delivery of material content on learning media is very clear.	5	Very good
11.	The delivery of the material provided is very systematic.	5	Very good
12.	There is a glossary of terms in the learning media.	5	Very good
13.	The learning media contains complete Lathe Machining Technique material.	5	Very good
Learning Aspects			
14.	There are instructions for use in the learning media.	5	Very good

No.	Indicator Statement	Score	Interpretation
15.	Flipbook learning media can be used in a flexible time and place.	5	Very good
16.	In learning media there is feedback to ensure the level of mastery of the material of the students.	5	Very good
17.	The learning media contains questions that can improve students' understanding of the material provided.	5	Very good
18.	There are illustrations that can help students' creativity.	5	Very good
19.	Appropriateness of using learning media as a means of critical thinking.	5	Very good
20.	Learning media can increase the intensity of student learning.	5	Very good

The results of the material expert validation get a total score of 100 and the expected total on the material expert validation is 100, the results of the material expert validation obtained are then converted into a percentage using the formula Arikunto (2013), namely:

$$\text{Presentase Kelayakan} = \frac{100}{100} \times 100\%$$

$$\text{Presentase Kelayakan} = 100\%$$

The result obtained is 100% which if converted into a sentence based on Sugiyono (2019) into a very feasible classification. Based on this, the learning media based on heyzine flipbook in the Lathe Machining Technique subject in terms of material is very feasible to use for learning.

2) Media Expert Validation Results

Media expert instrument validation was carried out by Doesen Mechanical Engineering Education Study Program, State University of Jakarta, namely Dr. Imam Mahir, S.Pd., M.Pd., the following are the results of media expert validation:

Table 3. Media Expert Validation Results

No.	Indicator Statement	Score	Interpretation
Display Aspect			
1.	The background color on the flipbook learning media looks contrasting.	4	Good
2.	The *layout* on the flipbook learning media is harmonious, so it looks aesthetically pleasing.	5	Very good
3.	The color composition contained in the learning media flipbook looks harmonious.	4	Good
4.	The quality of the images contained in the flipbook learning media looks clear and attractive.	5	Very good
5.	The quality of the video on the flipbook learning media is able to describe the content of the material.	4	Good
6.	The sentence writing on the flipbook learning media looks clear and systematic.	5	Very good
7.	The *font* used is simple and easy to read.	5	Very good
8.	There are varied buttons on the learning media that create an interesting impression.	5	Very good
9.	The placement of buttons on the flipbook learning media is in the right location.	5	Very good
10.	The cover of the flipbook learning media is harmonious so that it looks aesthetically pleasing.	4	Good
Programming Aspects			
11.	Ease of navigation contained in flipbook learning media.	5	Very good
12.	The navigation in the flipbook learning media looks consistent.	4	Good
13.	Flipbook learning media makes it easy for users to access subsequent information.	5	Very good
14.	The system on the flipbook learning media has a smooth operation.	5	Very good
Learning Aspects			
15.	Flipbook learning media has clarity of use in accordance with learning outcomes.	5	Very good
16.	Flipbook learning media makes it easy for students to understand the material.	4	Good
17.	The language used is easy to understand.	5	Very good
18.	There is feedback on flipbook learning media to ensure students' mastery of the material.	5	Very good
19.	Flipbook learning media has a good quality of interaction for its users.	5	Very good
20.	Flipbook learning media can be used in a flexible time and place.	5	Very good

The results of media expert validation get a total score of 94 and the expected total in media expert validation is 100, with this the percentage can be calculated using the formula Arikunto (2013), namely:

$$\text{Presentase Kelayakan} = \frac{94}{100} \times 100\%$$

$$\text{Presentase Kelayakan} = 94\%$$

The result obtained is 94% which if converted into a sentence based on Sugiyono (2019) into a very feasible classification. Based on this, the learning media based on heyzine flipbook in the Lathe Machining Technique subject in terms of media is very feasible to use for learning.

3) Media Feasibility Test Results

The media feasibility test was used on class XI students of SMK Kemala Bhayangkari 1 Jakarta who were studying Lathe Machining Engineering subjects in the even semester of the 2023/2024 school year with a total of 53 students, consisting of 2 classes majoring in Mechanical Engineering using a *Likert* scale that has 5 answers. The first step is for researchers to publish heyzine flipbook-*based* learning media on the website, in order to get an HTML link format. The second stage of the researcher provides an HTML link to the developed flipbook learning media then directs students to see and examine each material contained in the developed heyzine flipbook-*based* learning media. The third stage is to give students a *google form* link to fill out a questionnaire or questionnaire that has been given, the following are the results of the media feasibility test given to students:

Table 4. Media Feasibility Test Results

No.	Indicator Statement	Score	Maximum Score
	Material		
1.	The material presented is in line with the flow of learning objectives.	247	265
2.	The materials are easy to read and understand.	243	265
3.	Delivery of material using language that does not contain SARA (Ethnicity, Religion, Race, and Intergroup).	238	265
4.	Delivery of material using good and correct Indonesian language.	247	265
	Pendagogik		
5.	This learning media is interactive and communicative	244	265
6.	The instructions on the questions are clear and easy to understand.	237	265
	View		
7.	The appearance of this learning media is appropriate and attracts attention	242	265
8.	The use of text type and color helps me understand the material.	237	265
9.	The use of illustrations/images in learning media helps me understand the material	237	265
10.	Videos on learning media are clear and easy to understand.	234	265
	Navigation		
11.	The pages and navigation buttons make it easy for me to move between materials.	240	265
	Media Influence		
12.	Flipbook learning media can be used in a flexible time and place.	246	265
13.	This flipbook learning media makes it easier for me to understand the learning material.	248	265
14.	This learning media helps me to learn Lathe Machining Technique.	251	265

The results of the media feasibility test, getting a total score of 3391 and the expected total in the media feasibility test is 3710, with this the percentage can be calculated using the formula Arikunto (2013), namely:

$$\text{Presentase Kelayakan} = \frac{3391}{3710} \times 100\%$$

$$\text{Presentase Kelayakan} = 91\%$$

The result obtained is 91% which if converted into a sentence based on Sugiyono (2019) into a very feasible classification. Based on this, the learning media based on heyzine flipbook in the Lathe Machining Technique subject developed was very well received by the respondents as an independent learning resource.

Learning Lathe Machining Techniques

4) *Disseminate* Results

This last stage aims to disseminate research products for the learning process in Lathe Machining Engineering subjects. This will be done by providing an HTML formatted link and providing a *barcode scan*, then, this product will be submitted to the school of Mechanical Engineering department of SMK Kemala Bhayangkari 1 Jakarta. The following is the HTML link of the heyzine flipbook-*based* learning media.

https://heyzine.com/flip-book/8924c373ab.html

Figure 7. Heyzine Flipbook *Barcode Link*

2. Feasibility of Flipbook Learning Media

Researchers conducted a validation test, namely material expert validation, and media expert validation, and tested the feasibility of learning media to students to determine the feasibility of heyzine flipbook-*based* learning media that had been made. The purpose of this test is to test the feasibility of heyzine flipbook-*based* learning media that has been developed so that flipbook learning media is suitable for learning.

a. Material Expert Validation Test Results

The results of the material expert validation test conducted by Mr. Fajar Kusuma, S.Pd. get a percentage of 100%, heyzine flipbook-*based* learning media in Lathe Machining

Engineering subjects that have been developed are very feasible to use for the learning process in Lathe Machining Engineering subjects.

b. Media Expert Validation Test Results

The results of the media expert valdiation test conducted by Mr. Dr. Imam Mahir, S.Pd., M.Pd., get a percentage of 94%, heyzine flipbook-*based* learning media in Lathe Machining Engineering subjects that have been developed are very feasible to use for the learning process in Lathe Machining Engineering subjects.

c. Media Feasibility Test Results

The results of the media feasibility test to class XI students get a percentage of 91%, heyzine flipbook-*based* learning media in Lathe Machining Engineering subjects that have been developed are very feasible to use as an independent learning resource for Lathe Machining Engineering subjects.

Discussion

The learning media developed in this research is heyzine flipbook-*based* learning media for Lathe Machining Engineering subjects. Learning media is loaded in the form of a flipbook that contains text, video, audio, images, and also *links to* practice questions. This is in line with research conducted by H. S. Putri & Wiranti (2023) Flipbook learning media is a digital book that contains text, sound, images, and videos that are arranged in an attractive manner to increase the enthusiasm and understanding of students during learning activities.

Flipbook learning media offers the potential to improve learning with interactive features that make it easier to present interesting, creative and innovative multimedia content and can be accessed anytime and anywhere. According to Nabilah et al., (2023) in his research said that flipbook learning media is needed because it will facilitate the learning process, flipbook*s* are also easier to access at any time and make it easier to learn, more practical to use and in accordance with technological developments, so that KBM activities are more interesting and easier for students to understand.

The development of this flipbook learning media has passed the validation process by material experts, media experts. The material expert assessment gets a percentage of 100% getting a very feasible interpretation. This means that the flipbook media made can facilitate and assist the learning process and the media made is in accordance with the learning objectives to be achieved. This is in line with the theory put forward by Adam (2015) in Firmadani (2020) that learning media can help teachers to simplify the learning process. that learning media can

help teachers to make it easier to convey subject matter to students so as to facilitate the achievement of learning objectives that have been formulated.

Media expert assessment gets a percentage of 94% getting a very feasible interpretation. This can be interpreted that the flipbook learning media made can help learning to be more effective and interesting. This is in accordance with the theory put forward by Amanullah (2020) that learning using digital flipbook learning media is an alternative solution to support student learning in the era of the *industrial* revolution 4.0. learning will be very varied and interesting in terms of visual and audio-visual displays. In addition, it is also reinforced by the theory put forward by Martatiyana et al., (2022) that the use of flipbook media can be utilized and used to support student learning activities so that it can improve learning outcomes, motivation and attitudes of students in the learning process.

Based on the results of the feasibility test conducted on class XI students of Machining Engineering at SMK Kemala Bhayangkari 1 Jakarta consisting of 53 students who aimed to review the framework in the flipbook learning media both in terms of material content and appearance, which obtained data of 91% getting a very feasible interpretation, these results indicate that the flipbook media that has been developed is very well received by students as an independent learning resource.

This research uses the 4D development model (*define*, *design*, *develop*, and *disseminate*). To achieve optimal results, various parties are needed, such as material experts, media experts and respondents. In research conducted by Puspitasari et al., (2020) the development and feasibility of HOTS-based E-modules assisted by flipbook *markers* achieved very feasible results. The material expert score was 89.6%, the media expert was 86.0%. Qouri & Zulherman (2023) Qouri & Zulherman (2023) also conducted similar research to get decent results from media experts of 78.82%, getting very decent results from material experts of 93.33%, and student trials of 91.67%. So, based on this, the research conducted must at least achieve a decent score, by testing the validity of the material experts, media experts and media feasibility tests to respondents.

During the development of heyzine flipbook-*based* learning media in Lathe Machining Engineering subjects, there were several supporting and inhibiting factors in the development and implementation/testing process.

1. Supporting Factors

The following are some of the supporting factors in the implementation of this media development:

1. Because the use of the heyzine flipbook *maker* application that facilitates the process of developing learning media and the features it provides are also quite complete, making learning media more interactive.
2. The supervisor was very helpful in making heyzine flipbook-*based* learning media in this Lathe Machining Technique subject, making it easier for researchers in the preparation of materials and guidance in the learning media development process.
3. Not maximizing the use of flipbook learning media as a means of learning media makes students' curiosity and enthusiasm for this flipbook learning media very high.
4. The author's motivation to develop learning media so that it can be useful for students in SMK, and help educators in delivering learning materials.

2. Inhibiting Factors

The following are the inhibiting factors of this learning media development research:

1. The lack of understanding of researchers in using the heyzine flipbook *maker* application, so it is necessary to look for references first.

3. Product Advantages

Based on the results of the development of heyzine flipbook-*based* learning media in Lathe Machining Engineering subjects, it has several advantages, namely:

1. Learning media can be accessed anytime and anywhere.
2. The features contained in the learning media are very complete, making it easy to operate.
3. Accessible *online* via WEB link or QR Code using laptops, tabs and mobile phones of any type and brand.
4. This heyzine flipbook-*based* learning media in the Lathe Machining Technique subject explains and also displays material and demonstrates Lathe Machining Technique material because in the media there are images, as well as supporting videos about the material.

4. Product Weaknesses

Based on the results of the development of heyzine flipbook-*based* learning media in Lathe Machining Engineering subjects, it has several weaknesses, namely:

1. Media can only be accessed *online*, must have an internet network.
2. In addition, the writing in this learning media will look smaller if opened using a laptop because the display becomes two pages. But if opened using a cellphone the display is not too small because what is displayed becomes one page.

3. When playing a video, the *backsound* does not automatically turn off, and must be manually turned off using the *sound* feature provided.

5. CONCLUSIONS AND SUGGESTIONS

1. Conclusion

Research on the development of learning media based on heyzine flipbook in class XI Lathe Machining Engineering subjects at SMK Kemala Bhayangkari 1 Jakarta uses the R&D (Research and Development) research method and uses the 4D development model (Define, Design, Development, and Disseminate). The learning media developed is loaded in the form of a flipbook containing text, video, audio, images, and links to practice questions, and this flipbook learning media can be accessed *online* using a cellphone or device. The development of this flipbook learning media has passed the validation process by getting the results of material expert validation data of 100% getting a very feasible interpretation, and 94% of media experts where it gets a very feasible interpretation. Therefore, it was concluded that material experts and media experts stated that heyzine flipbook-*based* learning media in Lathe Machining Engineering subjects were declared feasible for use in the learning process.

In addition, the development of heyzine flipbook-*based* learning media in Lathe Machining Engineering subjects has been tested for feasibility to class XI students of SMK Kemala Bhayangkari 1 Jakarta getting data results of 91% getting a very feasible interpretation. It can be concluded that students state that heyzine flipbook-*based* learning media in Lathe Machining Engineering subjects are declared very feasible to use in the learning process.

2. Implications

The development of heyzine flipbook-*based* learning media in Lathe Machining Engineering subjects with the 4D development model (Define, design, development, and disseminate) is feasible to use as a learning media that helps the learning process of Lathe Machining Engineering. This heyzine flipbook-*based* learning media in Lathe Machining Engineering subjects can also be used as an independent learning media for students in learning Lathe Machining Engineering material without being limited in space and time.

3. Advice

Based on the results of research and development carried out, there are several suggestions from researchers, namely as follows:

1. Heyzine flipbook-*based* learning media can be implemented and utilized optimally in the learning process of Lathe Machining Techniques at SMK Kemala

Bhayangkari 1 Jakarta and other schools that have Lathe Machining Techniques subjects.

2. This research can be used as a reference as relevant research or further research can also be carried out such as the effectiveness of heyzine flipbook-*based* learning media in Lathe Machining Engineering subjects.

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