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Development Of Infographic Teaching Materials On B.J. Habibie's Contributions to the Construction Of Barelang Bridge In Batam City To Enhance Historical Awareness And Learning Outcomes Of High School Students In Batam

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Abstract History learning is conducted with the aim of building and nurturing historical awareness of the importance of past events. Historical awareness holds a crucial position in the existence of a nation. History provides ample opportunities for students to actively analyze various discoveries. Observations conducted by researchers regarding the Indonesian history subject at SMAN 16 Batam revealed several facts: 1) textbooks, when viewed in terms of their physical appearance, generally appear dull, and 2) the topic of B.J. Habibie's contribution to the construction of Barelang Bridge in Batam has not been used in schools. This research aims to produce infographic teaching materials on B.J. Habibie's contribution to the construction of Barelang Bridge in Batam to enhance historical awareness and learning outcomes among high school students in Batam. This research adopts the ADDIE research model. The instruments used for data collection in this study include: (1) questionnaires, (2) observations, (3) interviews, and (4) documentation.

Keywords: teaching materials, infographics, Habibie, Barelang, Batam, historical awareness, learning outcomes

Abstrak Pembelajaran sejarah dilaksanakan salah satunya memiliki tujuan untuk membangun dan menumbuhkan kesadaran sejarah akan pentingnya peristiwa di masa lalu. Kesadaran sejarah memiliki posisi sangat penting dalam keberadaan suatu bangsa. Sejarah banyak memberikan kesempatan kepada peserta didik untuk aktif menganalisis tentang berbagai temuannya. Observasi yang dilakukan peneliti mengenai mata pelajaran sejarah Indonesia di SMAN 16 Batam menemukan beberapa fakta yaitu: 1) buku teks yang secara umum ketika dilihat dari bentuk fisiknya terlihat membosankan, 2) materi kontribusi B.J Habibie dalam pembangunan Jembatan Barelang Kota Batam belum pernah digunakan di sekolah. Penelitian ini memiliki tujuan untuk menghasilkan bahan ajar infografis tentang kontribusi B.J Habibie dalam pembangunan Jembatan Barelang Kota Batam untuk meningkatkan kesadaran sejarah dan hasil belajar peserta didik kelas SMA di Batam. Penelitian ini menggunakan model penelitian ADDIE. Instrumen yang digunakan dalam pengumpulan data pada penelitian ini berupa (1) angket; (2) observasi; (3) wawancara; dan (4) dokumentasi.

Kata kunci : bahan ajar, infografis, Habibie, Barelang, Batam, kesadaran sejarah, hasil belajar



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INTRODUCTION

The purpose of history education is, among other things, to build and foster historical awareness of the importance of past events (Muhtarom et al., 2020). Historical awareness holds a very important position in the existence of a nation (Porda & Putro, 2012). History provides students with many opportunities to actively analyze various findings. History education gives rise to an awareness of the nature of cultural and human civilization development, which ultimately results in historical awareness (Sayono, 2013.).

Students' historical awareness must be strengthened because it relates to efforts to stimulate interest and learning outcomes in the classroom. To enhance historical awareness, there are several strategies teachers can use. One strategy is to create innovative media or teaching materials that match current characteristics. In the 21st century era, all sectors are already connected with technology, including education. Teachers can create something different by utilizing current technology. This will make learning different and enjoyable for students. Fun learning can trigger effective learning (Prastowo, 2015).

There are many factors that influence learning outcomes, namely internal factors and external factors. Internal factors are factors within the individual who is learning and are divided into two parts: physiological (physical) factors and psychological factors, which include intelligence, attention, interest, talent, motivation, maturity, and readiness. Meanwhile, external factors are factors that come from outside the individual and are divided into three parts: family factors, school factors, and community factors (Slameto, 2010).

Interest becomes an element in driving a person's motivation to concentrate on certain activities (Susanto, 2013). Historical awareness also plays an important role in fostering students' motivation. Teachers, as facilitators, can actively and creatively manage learning so that history education is not just about memorizing but also understanding the essence of each historical event. Teachers, besides teaching knowledge based on truth and facts, also play a role in fostering students' historical awareness (Suyanti, 2019).

One of the Basic Competencies (KD) related to students' historical awareness and learning outcomes is the contribution of B.J. Habibie in the construction of the Barelang Bridge in Batam City, which is very important for students at SMAN 16 Batam to understand. This material is rarely mentioned by teachers. Therefore, teachers have the opportunity to create something that can support the discussion of this material. One way is by using teaching materials.

Teaching materials are any materials (information, tools, or texts) arranged systematically, which present a complete picture of the competencies students will master and are used in the learning process for the purposes of planning and reviewing the implementation of learning (Prastowo, 2015). In short, teaching materials are any materials arranged systematically according to the competencies and learning objectives to be achieved. Teaching

materials are a set of materials required by teachers, arranged systematically, either written or unwritten, to create a learning atmosphere so that students can master the learning material thoroughly (Hamdani, 2011).

According to Majid (2013), teaching materials can be grouped into four categories: printed materials (textbooks, handouts, LKS, modules, leaflets, booklets, and infographics), audio materials (cassettes, radio, records, and CDs), audiovisual materials (VCDs and films), and interactive teaching materials (interactive CDs).

There are several reasons for choosing infographic teaching materials. First, the teaching materials used at SMAN 16 Batam are only in the form of textbooks, which generally look boring in terms of physical appearance. These textbooks are packaged with mostly text and few images, resulting in students' lack of interest in studying history due to a lack of innovation in the teaching materials. SMAN 16 Batam allows students to bring and operate smartphones during learning. This can be utilized in history education and become an innovation in teaching materials.

Second, the infographic teaching materials on the contribution of B.J. Habibie in the construction of the Bareleng Bridge in Batam City have never been used in the school. This necessitates the need for other teaching materials to complement the main teaching materials used in the classroom. The content of this infographic teaching material is the contribution of B.J. Habibie in the construction of the Bareleng Bridge in Batam City, related to the basic competencies found in textbooks. In this case, the basic competency used is Basic Competency 3.5: Evaluating the political and economic life of the Indonesian nation during the New Order era.

From the explanation of the facts at SMAN 16 Batam, there are several solutions to address them. The first is related to the use or availability of teaching materials through innovation in the use of teaching materials during the history learning process. Infographic teaching materials are chosen as one of the supporting teaching materials. Infographic teaching materials are expected to be feasible to use as teaching materials in the learning process, as the material content presented is a sub-chapter of the main material on the political and economic life of the Indonesian nation during the New Order era.

The difference between this research and previous research is that the material on B.J. Habibie's contribution to the construction of the Bareleng Bridge in Batam City is appropriate to be presented to students. Teaching materials with this content can address the issue of students' lack of knowledge, which impacts their historical awareness and learning outcomes. Therefore, the researcher intends to write "Development of Infographic Teaching Materials on B.J. Habibie's Contribution to the Construction of the Bareleng Bridge in Batam City to Enhance Historical Awareness and Learning Outcomes of 12th Grade Science Students at SMAN 16 Batam."

METHOD

The research model used by the researcher is the research and development (R&D) method. Research and development is an approach applied when developing teaching materials to aid instruction (Ibrahim, 2016). Research and development is systematic and creative research aimed at increasing the capacity of knowledge or making applications of existing knowledge (OCDE, 2015). This research includes curriculum, media and technology, instructional learning, teacher education, and didactics (Akker, 1999). Research and development combine development that produces products or course prototypes and research that consists of justification supported by theoretical analysis, empirical data, and its interpretation (Gravemeijer, 1998). Thus, it can be concluded that research and development is systematic and creative research that combines the development of educational products to aid teaching and the analysis of these educational products.

The product in question is not always in the form of hardware/print materials like books, modules, and leaflets but also software, such as computer programs for data processing, classroom learning, learning models, or evaluation tools. The focus of this research is to develop infographic teaching materials on the topic "B.J. Habibie's Contribution to the Construction of the Barelang Bridge in Batam City." The development steps used in this research are an adaptation of the ADDIE model (Analyze, Design, Development, Implementation, Evaluation). The ADDIE model is a systematic model.

The subjects of the trial in the development of infographic teaching materials on the topic "B.J. Habibie's Contribution to the Construction of the Barelang Bridge in Batam City" include material experts and media experts. The trial subjects are not only material expert lecturers and media expert lecturers but also students who are also trial subjects. The formative evaluation subjects are six students from class XII IPA 1 at SMAN 16 Batam, chosen randomly. The selection of these six students is considered representative of the 30 members of the class. The summative evaluation subjects are all students of class XII IPA 1 at SMAN 16 Batam. Class XII IPA 1 was chosen using purposive sampling. This technique was carried out based on considerations from the Indonesian History subject teacher. The selection of the class also influences the research results.

The types of data generated from this development are quantitative and qualitative. Quantitative data consists of scores derived from questionnaires filled out by media experts, material experts, and students during the trial, as well as students' scores before and after the trial implementation of the teaching materials. Qualitative data comes from notes in the comment columns provided by media experts, material experts, and students during the trial.

The data collection instruments are tools selected and used by the researcher to systematically and easily collect data during their activities (Arikunto, 2010:265). The

instruments used in this research are media practicality questionnaires, learning outcome evaluation tests, and historical awareness questionnaires.

RESULT AND DISCUSSION

In the analysis stage, several aspects need to be explained: needs analysis, student analysis, and curriculum analysis.

1. Needs Analysis: This is conducted to determine what the students actually need. It was found that there is a lack of variety in the learning media used in the teaching process. In Indonesian history lessons, only the Indonesian History textbook is used, and its quantity is limited. Additionally, there is a lack of development in the material presented, especially concerning local history. Local history can be a key to making history lessons more engaging.
2. Curriculum Analysis: This is done to understand the learning demands set by the government. Curriculum analysis involves examining the Core Competencies (Kompetensi Inti, KI) and Basic Competencies (Kompetensi Dasar, KD) as the foundation for developing the next set of materials. In this research, the KD used is KD 3.5, which is "Evaluating the political and economic life of the Indonesian nation during the New Order period."
3. Student Characteristics Analysis: This involves understanding the characteristics of the students who will be using the teaching materials.
4. Material Analysis: This involves examining the content that will be developed into teaching materials.

Based on these analyses, the researcher developed infographic teaching materials on the topic "B.J. Habibie's Contribution to the Construction of the Bareleng Bridge in Batam City."

In this stage, there are several activities: selecting content that matches students' characteristics and competency requirements, implementing teaching strategies, and determining assessment methods and evaluation forms. This design phase is crucial before developing the prototype of teaching materials. The selection of content must align with students' characteristics and competency requirements. The chosen topic is "B.J. Habibie's Contribution to the Construction of the Bareleng Bridge in Batam City."

The next stage is development. This stage involves translating the design specifications into physical form, resulting in a prototype of the product being developed. The outcomes from the previous design stage are materialized into a prototype. During this stage, sourcing materials for compiling teaching materials, typing, arranging the layout of teaching materials, and performing coloring or final design activities for the teaching materials are carried out.

The next stage is implementation. Here are the validation results from the content and media experts:

1. Validation Results from Content Expert

Validation of the content was conducted by Dr. Deny Yudo Wahyudi, S.Pd., M.Hum, a lecturer from the Department of History, Faculty of Social Sciences, State University of Malang. The data obtained from the content expert consists of quantitative data in the form of a rating questionnaire with a score range of 1-4, and qualitative data in the form of comments and suggestions provided by the expert validator.

Based on the validation data analysis by Dr. Deny Yudo Wahyudi, the total score given by the content expert validator ($\sum X$) was 38 out of a maximum score ($\sum X_i$) of 40, resulting in an average percentage of 95% (see Table 4.1). This 95% percentage was derived from 10 questions, with 8 questions scoring 4 (excellent/ very suitable/ very appropriate/ very clear/ very easy/ very precise/ very interesting), and 2 questions scoring 3 (good/ suitable/ appropriate/ clear/ easy/ precise/ interesting). The total percentage from the content expert validation data is categorized as highly valid.

2. Validation Results from Media Expert

Validation of the teaching materials was conducted by Indah Wahyu Puji Utami, S.Pd., S.Hum., M.Pd., Ph.D., a lecturer from the Department of History, State University of Malang, on March 28, 2024. The data obtained from the media expert validation consists of quantitative data in the form of a rating questionnaire with a score range of 1-4, and qualitative data in the form of comments and suggestions provided by the expert validator.

Based on the validation data analysis by Dr. Nur Wahyu Rochmadi, M.Pd., M.Si., the total score given by the media expert validator ($\sum X$) was 38 out of a maximum score ($\sum X_i$) of 40, resulting in an average validation percentage of 95%. This 95% percentage was derived from 10 questions, with 8 questions scoring 4 (excellent/ very suitable/ very appropriate/ very clear/ very easy/ very precise/ very interesting), and 2 questions scoring 3 (good/ suitable/ appropriate/ clear/ easy/ precise/ interesting). The total percentage from the media expert validation data is categorized as very valid.

In this final stage, the activities include both formative and summative evaluations. Formative evaluation is conducted to collect data at each stage for refinement purposes. Summative evaluation is performed to assess the effectiveness of the Indonesian history learning.

Formative evaluation involves small-group trials with 6 students. The rationale for selecting 3-6 participants is that they represent the population before large-scale testing. Formative evaluation aims to assess the product's suitability for further refinement. Summative evaluation is conducted with a larger group of 30 students in a classroom setting. These 30

students represent the total population chosen as research subjects. Summative evaluation aims to evaluate the product's suitability and effectiveness when used in Indonesian history learning.

In the evaluation phase, questionnaires with several criteria for assessment and numeric rating options are used. The evaluation includes the following:

1. Small-Group Trial

The trial involves 6 randomly selected students from class XI.4. The trial uses a designed questionnaire and takes place at SMAN 16 Batam. The evaluation results consist of thirteen questions. Through the small-group trial evaluation, the total score ($\sum X$) obtained was 286 out of a maximum score ($\sum X_i$) of 312, resulting in an average percentage of 91.67%.

2. Large-Group Trial

The large-group trial is conducted in a classroom at SMAN 16 Batam, using a designed questionnaire for assessment. The evaluation consists of fourteen questions. Through the large-group trial evaluation, the total score ($\sum X$) obtained was 1358 out of a maximum score ($\sum X_i$) of 1508, resulting in an average percentage of 90.05%.

The large-group trial also assesses learning outcomes and historical awareness of students through pre-tests and post-tests.

Next, a normality test is conducted to determine if the data follows a normal distribution. This test is applied to both sets of data obtained in the pre-test and post-test phases for the control and experimental groups. The Shapiro-Wilk test is used for normality testing with SPSS 20 software. The criteria for testing are as follows: normality is considered fulfilled if the significance value is greater than 0.05; if the significance value is less than 0.05, normality assumption is not met (Arikunto, 2010).

Based on the significance level data, it is found that the significance of the pre-test learning outcomes is 0.145. Therefore, it can be concluded that the significance value is greater than 0.05, indicating that the pre-test learning outcomes are normally distributed. Based on the significance level data, it is found that the significance of the post-test learning outcomes is 0.238. Therefore, it can be concluded that the significance value is greater than 0.05, indicating that the post-test learning outcomes are normally distributed.

Based on the significance level data, it is found that the significance of the pre-test historical awareness is 0.441. Therefore, it can be concluded that the significance value is greater than 0.05, indicating that the pre-test historical awareness is normally distributed. Based on the significance level data, it is found that the significance of the post-test historical awareness is 0.113. Therefore, it can be concluded that the significance value is greater than 0.05, indicating that the post-test historical awareness is normally distributed.

Once the data is confirmed to be normally distributed, a paired sample t-test is conducted to compare the learning outcomes and historical awareness results.

According to Santoso (2014), the decision-making guidelines in the paired sample t-test based on the significance value (Sig.) output from SPSS are as follows:

- If Sig. (2-tailed) < 0.05, then H_0 is rejected and H_a is accepted.
- Conversely, if Sig. (2-tailed) > 0.05, then H_0 is accepted and H_a is rejected.

Explanation:

- H_0 : There is no difference in the average between pre-test and post-test learning outcomes (There is no influence of using Infographics in improving learning outcomes for class XII IPA SMAN 16 Batam).
- H_a : There is a difference in the average between pre-test and post-test learning outcomes (There is an influence of using Infographics in improving learning outcomes for class XII IPA SMAN 16 Batam).

Based on the "Paired Samples Test" results above, the Sig. (2-tailed) value is $0.001 < 0.05$. Therefore, H_0 is rejected, and H_a is accepted. Thus, it can be concluded that there is a difference in the average between pre-test and post-test learning outcomes, indicating an influence of using Infographics in improving learning outcomes for class XII IPA SMAN 16 Batam.

A difference test is also conducted for the historical awareness data using a paired sample t-test. Based on the "Paired Samples Test" results above, the Sig. (2-tailed) value is $0.000 < 0.05$. Therefore, H_0 is rejected, and H_a is accepted. Thus, it can be concluded that there is a difference in the average between pre-test and post-test historical awareness, indicating an influence of using Infographics in improving historical awareness for class XII IPA SMAN 16 Batam.

The product resulting from this research is an instructional infographic material. Infographic products have been developed by several researchers before, but this research introduces a different instructional material. The instructional material developed is an infographic on "The Contribution of B.J. Habibie to the Construction of Barelang Bridge in Batam City".

The infographic instructional material is a non-print and non-cetakan product that can be used both in printed and digital formats. This material was developed to facilitate students of XII IPA 1 SMAN 16 Batam in studying Indonesian history. This aligns with the purpose of instructional material development as explained by Prastowo (2015), which aims to facilitate students in learning and understanding lessons, thereby enhancing their knowledge and insight.

According to Prastowo (2015), instructional materials are systematically arranged materials (including information, tools, and texts) that present a complete picture of the competencies to be mastered by students and are used in the learning process with the goal of planning and reviewing the implementation of learning. In short, instructional materials are

systematically arranged materials according to the competencies and learning objectives to be achieved. The infographic on "The Contribution of B.J. Habibie to the Construction of Barelang Bridge in Batam City" is aligned with the basic competencies of Indonesian history at the senior high school level, focusing on KD 3.5, which evaluates the political and economic life of Indonesia during the New Order era.

The content is created with the aim of providing new knowledge to students about B.J. Habibie's contribution to the construction of Barelang Bridge in Batam City. Previously, students only understood that Barelang Bridge is an icon of Batam and a tourist attraction. Through this infographic, they come to understand the significant contribution of B.J. Habibie in its construction. The hope is that students can draw inspiration from his spirit in nation-building.

The infographic instructional material as a product of research and development falls under the category of static infographics. According to Yudhanto and Raswanto in Ratminto (2017), static infographics are presented as non-moving images. This infographic instructional material presents information on the objectives of bridge construction, the parts of the bridge, and B.J. Habibie's role in its construction. The creation of this leaflet infographic instructional material has adhered to the criteria for infographic preparation according to Fulton and McGuinness (2016):

1. Clear objectives.
2. Effective data presentation.
3. Clear, attractive, and organized design.
4. Focus on important points of information.
5. Use of relevant icons.

The infographic on "The Contribution of B.J. Habibie to the Construction of Barelang Bridge in Batam City" has gone through several stages: expert validation, formative evaluation, and summative evaluation. During the expert validation stage by content and media experts, the infographic material obtained a validation percentage of 95% for content and media, categorizing it as highly valid. Following this, small-group trials were conducted with 6 students, resulting in an evaluation percentage of 91.67%. Subsequently, large-group trials were conducted with 30 students, resulting in an evaluation percentage of 90.05%.

Regarding the difference in learning outcomes, it was found that the Sig. (2-tailed) value was $0.001 < 0.05$, indicating a significant difference between pre-test and post-test learning outcomes. This suggests an influence of using infographics in improving learning outcomes for class XII IPA SMAN 16 Batam. The improvement in learning outcomes is influenced by the novelty of the material and media used.

Furthermore, based on motivation survey results and difference tests, it was found that the Sig. (2-tailed) value was $0.000 < 0.05$, indicating a significant difference between pre-test and post-test historical awareness. This indicates an influence of using infographics in enhancing historical awareness for class XII IPA SMAN 16 Batam.

Advantages of the infographic instructional material on "The Contribution of B.J. Habibie to the Construction of Barelang Bridge in Batam City" include:

1. Its simple yet attractive appearance.
2. Facilitation of student understanding of the included material, which presents only key points.
3. Despite its simple F4 size, the infographic provides concise and clear material.
4. The material is accompanied by relevant images, aiding student comprehension.
5. The infographic instructional material can be used in both print and digital formats.

Disadvantages include:

1. The process of creating the leaflet infographic material requires the use of applications like Canva, which may involve premium paid content.
2. Printing the material incurs costs.
3. The material presented in the infographic is not part of the Indonesian history textbook.

CONCLUSION

In conclusion, the research and development of the infographic material on "The Contribution of B.J. Habibie to the Construction of Barelang Bridge in Batam City" serves as an alternative instructional material and supplementary content for textbook learning in Indonesian history. This infographic material enhances the variety of learning media used, as traditional learning in Indonesian history classes was previously limited to textbooks. The material presented in the infographic about B.J. Habibie's contribution to the construction of Barelang Bridge serves as a means for students to gain knowledge about local history. Formative and summative evaluations indicate high validity and suitability for use as an Indonesian history instructional medium. Additionally, the infographic has proven effective as an instructional material for Indonesian history, evidenced by the difference in learning outcomes and increased historical awareness among students. Thus, the objectives of this research and development have been achieved.

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