SCIENTIFIC PAPER

Bridging Technology and Geography: Contextual E-Comics for Enhanced Learning in Indonesian Natural Resource Management

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ABSTRACT
This study explores the development of innovative digital learning media in geography education during the COVID-19 pandemic. It uses contextual e-comics to help people learn more about Indonesian natural resource management. These were made through a research and development process that used the ADDIE model, which stands for Analysis, Design, Development, Implementation, and Evaluation. The final product is a contextual E-Comic in PDF format designed to enhance learning in geography. Feasibility and effectiveness were vital evaluation metrics. Validation by media, subject matter experts, and linguists yielded approval ratings of 96%, 71%, and 92%, respectively. Student trials showed an 89% acceptance rate, and teacher feedback indicated a 92% approval rating. An important finding was that the E-Comic worked, as demonstrated by a paired sample t-test with a significant t-value of 0.000. This indicates that it could be a valuable educational tool during the pandemic. This study addresses the challenges of geography education during a global health crisis and showcases the potential of digital media to enhance learning experiences.

KEYWORDS
E-Comic; Contextual Approach; Geography Learning

INTRODUCTION
In the rapidly evolving educational landscape of the 21st century, geography teachers are tasked with innovating learning methodologies to meet the dynamic needs of students. As a discipline, geography extends beyond merely studying the earth's surface; it encompasses the analysis of natural phenomena and the applied sciences of the earth's use and management (Huri, 2019). Geography is challenging because it involves concrete and abstract ideas, so different teaching methods are needed to ensure students fully understand (Ari et al., 2018).

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The advent of science and technology has significantly transformed. Educational paradigms introduce novel tools and media to facilitate learning. This technological progression demands a corresponding elevation in educational quality and professionalism (Baharudin, 2015). The impact of these advancements is particularly pronounced in geography education, where the effective integration of technology can bridge the gap between theoretical knowledge and practical application.

The role of learning media has become increasingly pivotal in this context. Effective learning media enhances educational content delivery and fosters student motivation and engagement (Nurrita, 2018; Peprizal & Syah, 2020). The digital era has ushered in a shift from traditional to more sophisticated digital learning mediums. This transition is exemplified in the potential shift from conventional print comics to digital e-comics, offering an innovative approach to illustrating complex geographical concepts (Mafirah, 2016). Such advancements in learning media are not merely additive but transformative, fundamentally altering the learning process to suit the digital age better. The evolution of science and technology and the unique challenges of geography education underscores the need for continual adaptation and innovation in teaching methodologies and learning media. This adaptation is crucial for adequate learning outcomes and aligns with the ongoing efforts to enhance the quality of education in Indonesia (Budi et al., 2016).

Deep media learning: Many physical types convey the media learning material, including video, audio, film, photos, images, graphics, and slides. Digital comics, or e-comics, is the development of media that uses images. Digital comics are learning media with presentation information via electronic media that load stories with pictures and character figures with help from computers (Hidayah et al., 2017; Purnama et al., 2015). The principle in Curriculum 13, namely, utilizes technology, information, and communication to increase efficiency in the learning process (Permendikbud, 2014). That thing happens as a consequence of the paradigm shift in education that occurs today, namely learning carried out based on technology, so that the learning process that is currently demanded tends to use technology (Muhasim, 2017).

Efficiency in learning can be achieved by using creative, innovative, and exciting learning media because motivation for study can increase. As a visual medium, E-comic presents interesting material concretely and may increase student motivation. Concrete visual media can make it easier for students to absorb material content (Kurniawati & Nita, 2018; Indriasih et al., 2020). Digital comics (e-comic) can be developed by contextually linking material related to management material in Indonesian Natural Resources. Development of learning media from comics. This e-comic is equipped with a QR code. The development of e-comic media increases students’ interest in studying. It provides new experiences for students, so it is possible to use the learning media E-Comic to make it easier for students to understand the material's content.

Approach Context helps students connect their information with the information applied in life every day. Application is done by connecting knowledge possessed by life (Hidayat, 2013). Students with more experience become more relevant to the approach’s context because the contextual approach assists students in developing information that can be used in their learning throughout their lives. A contextual approach in learning media can be realized by utilizing the environment as a source of learning. A regionally contextual approach is applied to the learning medium of E-Comic. Based on the experience that has been owned,
the method is contextually used to link management materials from the Power Indonesian nature source with real students.

The 2013 Indonesian curriculum was meticulously crafted to foster soft and hard skills, preparing students to navigate various environments adeptly (Zanna & Marlinang Sitompul, 2017). Central to this curriculum is integrating information and communication technology to enhance the learning process’s efficiency and effectiveness (Winda, 2016). This has led to the development of computer-based learning media designed to be more engaging and adaptive, thereby boosting student motivation (Mukaromah, E. 2020).

This curriculum framework focuses on mastering core competencies as outlined in Basic Competencies 3.3, particularly in Class XI. This involves a comprehensive engagement with factual, procedural, conceptual, and metacognitive knowledge across various disciplines, including science, technology, the arts, culture, and the humanities. The curriculum promotes a complete worldview, including humanity, statehood, nationality, and civilization. It then significantly uses this understanding in specific study areas tailored to each student's skills and interests when solving problems. According to the Class XI Indonesian Natural Resources Management material, a critical part of these skills is analyzing how natural resources are distributed and managed in areas like forestry, mining, marine, and tourism in a way that does not harm the environment.

Essential Competencies 3.3 requires synthesizing core competencies and the curriculum content, emphasizing a deep understanding of scientific concepts. This need has prompted the development of contextual e-comics, an innovative approach that meets the requirement for factual analysis through a contextual lens. The study of Indonesia's natural resources is characterized by its systematic and holistic nature, requiring in-depth coverage within a limited timeframe. Hence, the adoption of visual learning media like e-comics is crucial. These media effectively illustrate ideas and facts in a visually engaging format, enhancing the understanding and retention of Indonesian Natural Resources Management content.

A needs assessment at a senior high school in Sampung indicated a requirement for more engaging learning media to facilitate the effective use of technology in teaching. E-comics have emerged as a promising medium, capable of presenting material engagingly and tangibly, thus increasing student motivation and enhancing the absorption of the material. The existing learning media at this school, including PowerPoint presentations, videos, and textbooks from Erlangga, highlight a gap that E-Comics could fill to stimulate student engagement further.

Additionally, a survey among students in Class XII Social Sciences 1 revealed that 72% required e-comic media to grasp the subject matter better. Remarkably, 94% indicated the need for digital development of E-Comics, and 97% specifically requested E-Comics for studying Indonesian Natural Resources Management. Furthermore, 60% of the students perceived the current material as needing more engaging. A significant 63% found the topic of Indonesia's natural resources management challenging to understand, with 72% viewing it as reliant on rote learning. Moreover, 66% of students identified the sub-chapter on mining materials' potential and distribution as more complex than other sections.

Furthermore, an analysis of student needs in Class XII Ilmu Sosial 1 revealed that most (72%) require E-Comic learning media to understand the subject better. Additionally, 94% of students expressed a need for the digital development of E-Comics, and 97% identified a need for E-Comics tailored explicitly to the study of
Andarukmi, dkk

Indonesian Natural Resources Management. This data suggests that the current material is perceived as unengaging or challenging, with 60% of students finding the material boring, 63% finding it difficult to understand, and 72% viewing it as heavily reliant on memorization. Notably, 66% of students found the subchapter on the potential and distribution of mining materials more challenging compared to other sections.

The previous iterations of educational e-comics encountered challenges in consistently delivering comprehensive material coverage. This limitation was primarily due to the episodic nature of the content, which restricted the depth and breadth of material conveyance. Recognizing this gap, our research aims to innovate by developing an e-comic with QR codes tailored to study Indonesian natural resources management. This novel approach enhances content delivery by enabling students to access supplementary video resources through QR codes, enriching their understanding of the subject matter.

In this pioneering endeavor, we have incorporated manually created digitized images, adding authenticity and engagement to the learning material. Additionally, integrating QR codes serves as a conduit for extending the educational content. These codes link to carefully curated videos that complement and expand upon the E-Comic narrative, offering a multifaceted learning experience. Developing this e-comic involves crafting a digital comic narrative that is visually appealing and pedagogically sound. This project's imagery and cartoon characters are selected based on their appeal to the student demographic, ensuring high engagement levels. The procedure involves manual illustration and then digitalization, allowing the inclusion of student-favorite characters within the E-Comic framework. This bespoke approach to character design is anticipated to foster a deeper connection between the students and the learning material.

Furthermore, the E-Comic is being developed using Pixton, an application or web-based comic creation service. This platform enables the meticulous arrangement of story panels pre-designed on a storyboard, ensuring a coherent and engaging narrative flow. This methodical process underscores the innovative nature of our research, blending traditional storytelling with modern digital tools. The manufacturing process of the E-Comic on Pixton involves careful panel arrangement to align with the preconceived storyboard, ensuring a seamless and logical narrative progression. This approach is indicative of our commitment to high-quality educational content creation.

This research and development project focuses on creating an e-comic equipped with QR codes, a novel educational tool aimed at simplifying and enhancing the learning process for students. The E-Comic is contextually based, drawing connections to everyday life, making the study of Indonesian Natural Resources Management more relatable and accessible. This innovative approach represents a significant advancement in geography education, offering a dynamic and interactive learning experience that aligns with contemporary educational needs and preferences.

METHOD

The present study is classified as a research and development (R&D) endeavor using the ADDIE development paradigm. The ADDIE paradigm consists of five distinct phases, including the analysis, design, development, implementation, and evaluation stages shown in Figure 1. The ADDIE model is
favored due to its organized framework and straightforward processes in learning media development. Nevertheless, scholars have altered the ADDIE development model until the implementation phase. The following content outlines the developmental flow of the ADDIE paradigm.

![ADDIE Model Flowchart](image)

**Figure 1. Flowchart of the ADDIE Model**

The development of e-comic learning media was carried out using open questionnaire data and closed questionnaires. This is done because, for now, the feasibility of E-Comic has developed according to the checklist results of the respondents. A closed questionnaire is used because it is easy to measure, while an open questionnaire aims to get suggestions from respondents on e-comic media. E-comic was tested on teachers and class XII Social Science 1 students at Negeri 1 Sampung. The selection of the XII Social Science 1 class is because the class has been learning about Indonesian Natural Resource Management material in Geography subjects at 1 Sampung High School.

The development of the E-Comic learning medium was facilitated by using both open-ended questionnaire responses and closed-ended inquiries. Based on the participants' completed checklist results, it has been decided to create an e-comic. A closed questionnaire is based on its convenience for quantifiable assessment, but an open questionnaire is applied to solicit comments from participants about e-comic media. The effectiveness of E-Comic was assessed via a comprehensive evaluation procedure that included educators and students from the XII Social Science 1 class at Se 1 Sampung High School. The decision to choose the XII Social Science 1 class is justified by their previous familiarity with the Indonesian Natural Resource Management curriculum, namely within the Geography subject at 1 Sampung High School.

Test results from research subjects and validators can be changed in percentage form by using a formula as follows:

\[
P = \frac{\sum X}{\sum X_i} \times 100 \%
\]

**Description:**
P: Percentage appropriateness
\(\sum X\): The total score of answers from respondents
\(\sum X_i\): The total number of highest answer scores
100: Constant

The total results from respondents, that is, media, materials, and language experts, as well as responses from students and teachers in evaluation
appropriateness products, can be obtained based on validation test results that have been carried out. Next, assessment appropriateness products are categorized at several levels based on criteria that have been determined. Product eligibility can be determined based on Table 1.

<table>
<thead>
<tr>
<th>No</th>
<th>Percentage</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>76% - 100%</td>
<td>Very eligible or very valid</td>
</tr>
<tr>
<td>2</td>
<td>56% - 75%</td>
<td>Eligible or valid</td>
</tr>
<tr>
<td>3</td>
<td>40% - 55%</td>
<td>Ineligible or invalid</td>
</tr>
<tr>
<td>4</td>
<td>0% - 39%</td>
<td>Very inappropriate or very invalid</td>
</tr>
</tbody>
</table>

Source: (Supriyanto & Erawanto, 2020 with modifications)

The percentage table shows that the higher the result percentage, the more media learning's increasing quality will be better and more worthy if used. If the percentage of learning media is 40%, revise it so you can use it in the learning process. The following are the criteria for evaluation level understanding for students shown in Table 2.

<table>
<thead>
<tr>
<th>No</th>
<th>Understanding Level Qualification</th>
<th>Classification Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>76 – 100</td>
<td>Very high</td>
</tr>
<tr>
<td>2</td>
<td>56 – 75</td>
<td>High</td>
</tr>
<tr>
<td>3</td>
<td>40 – 55</td>
<td>Low</td>
</tr>
<tr>
<td>4</td>
<td>0 – 39</td>
<td>Very low</td>
</tr>
</tbody>
</table>

Source: (Supriyanto & Erawanto, 2020 with modifications)

This research uses a pre-experimental design, one group pre-and post-test. The effectiveness of learning media can be determined by conducting an effectiveness test. Research without group control or group comparison, so one group pretest and posttest in accordance if used (Jaji, 2020). A one-group pretest-posttest design was carried out with measurements in the group before the given treatment (pretest) and after the given treatment (posttest). Pretest and post-test results were analyzed using statistical tests, namely a normality test using Shapiro Wilk, which was then carried out using a paired sample t-test and paired sample t-test to determine the difference in the means of two samples in pairs (Wiliam & Hita, 2019).

RESULT AND DISCUSSION

A good comic is created with attention. Several aspects need to be considered: time or moment, election picture or image, frame selection, word selection, and selection channel read. Three techniques are related to manufacturing comics: traditional, hybrid, and digital. Under development, this e-comic is done using digital or digital techniques, where the comic is done purely digitally and without traditional methods (Musnur & Faiz, 2019). Development of this digital comic is done in several stages based on the ADDIE development model, as follows: The following are stages in the development of the E-Comic:

Analyse

This stage carries out curriculum, field conditions, and student needs analyses. They are analyzing conditions in the field by analyzing student characteristics by directly observing learning activities and conducting interviews with geography teachers at SMAN 1 Sampung. The results of interviews with
geography teachers obtained information about learning using media in the form of PowerPoint and video. The determination of KI and KD by the 2013 curriculum is carried out in the analysis curriculum. The curriculum was analyzed by determining the appropriate KI and KD 2013 curriculum. Under development, E-Comic is based on indicator achievement competence for students with the 2013 curriculum.

**Design**

This stage is done by making a storyboard regarding the developed learning medium. This stage is for the compilation of E-Comic media design. Stage design uses the results obtained from the analysis stage to plan internal strategies for designing E-Comics.

**Development**

Developing the E-Comic was done by making storyboards during the creation sketch E-Comic, then compiling fill based on channel stories conceived and designed for storyboards. Development This E-Comic is done using the needs analysis and analysis condition field that has been done. Development in this stage is carried out to prepare product development that has been designed before. The following are results, stage development, or stage development in E-Comic. **Figure 1** shows the initial appearance of E-Comic.

![Figure 1. The initial appearance of E-Comic](image)

Development results in a product E-Comic on management material source Power Indonesia's nature is "The Explorer's Twins" in the form of a flipbook in CDR format. The front display consists of the E-Comic title, The Explorer Twins, equipped with the Malang State University logo and the writer's class logo. The light green cover concept with black text describes the E-Comic being developed. This e-comic has several features: character introductions, appearances of fundamental and core competencies, story content, supporting materials, and information. The instructions for using E-Comic aim to explain how to use E-Comic so that readers can understand how to read E-Comic correctly based on the E-Comic that has been developed. The following features are contained in the learning medium, E-Comic, shown in **Figure 2** and **Figure 3**.
Materials and information support This e-comic, entitled “The Explorer Twins,” is packaged in a QR code and contains videos as additional material for Outlook students. Material available in QR Code covers principal discussion regarding potential and distribution material mines that add additional material about a) the description of limestone, b) the limestone mining process, c) the blasting or blasting process in limestone mining, d) the process of burning and processing limestone. This QR code is used to give students a description of these processes. If done, students can understand the process or stages carried out when processing limestone. That thing can add knowledge to students. This e-comic was developed using a contextual approach. A contextual approach can be used to facilitate students in constructing and discovering their knowledge themselves. The learning process approaches students' contextual connections, connecting lesson material at school with daily life based on experienced students.
Learning by engaging students makes knowledge attached and embedded in students' memories (Maulana et al., 2016). Use an approach contextual to development. This e-comic contains content that relates to every day based on students' experiences. Development This e-comic was carried out using Telaga Ngebel at the beginning of the story, where Telaga Ngebel is the icon of the Regency Ponorogo. To discuss the management of natural resources and things associated with how the water got said to be a superpower, nature can be updated, so based on experience, students who have visited the Ngebel Lake tourist attraction can find themselves and connect with the material. Figure 4 shows the approach contextual in E-Comic.

Figure 4. Approach contextual

Approach This contextual context is also linked to existing problems in the environment around the student; that is, the Sari Gunung mine is nearby. The research location is at Senior High School 1 Sampung. The method used is by hooking the full story by the approach. Another contextual way is by discussing limestone quarries located nearby. Senior High School 1 Sampung is in front of "Sari Gunung" limestone mining, so students can know the environment around them and analyze problems occurring around limestone mining. Sari Gunung mining has neither a positive nor a negative impact. If it is connected to the material, then the student can know how to analyze the impact environment appropriately by the principal's development.

Implementation

Stage implementation: introduction of products to students and teachers. This stage requires a validation test, as well as suggestions and grades from the validator, to evaluate the suitability of this medium for use. Validation was done towards media expert validators, material experts, and experts' language using open and closed questionnaires. Validation tests were also carried out based on teacher responses and student feedback. This validation test is used to determine the suitability of this medium so that it can be widely used. This research was implemented at Senior High School 1 Sampung, class XII IPS 1, with 20 students and one geography teacher.
The validation product held aimed to get a mark of validity about the feasibility of the media being developed. This development was validated by validators, namely media experts, material experts, and experts’ language. The learning media validator is an expert lecturer in comic media; the material validator is a geography lecturer who is an expert in management material for Indonesian natural resources; and the language validator is an expert lecturer in the field structure language. Based on the results of validation, the data obtained from the validator is qualitative and quantitative data from comments, suggestions, and scores for product development in E-Comic.

This product obtains good results with due diligence because it is category-worthy and very worthy. The highest validation results were for experts, who got a percentage of 96%. These results were obtained because E-Comic has advantages in the aspect of color. The feasibility test for media experts can be tested in the field without any revisions. The results of material validation obtained a percentage of 71%. This is influenced by the E-Comic story, which is too long and requires material to be discussed in depth so that it can be tested in the field with revisions. Based on the language validation results, the percentage result was 90%. This assessment has a weakness: the spelling is not by PUEBI, so it can be tested in the field with revisions. Based on results validated by validators, media experts, material experts, and language experts, there are several revisions for improvement, which are as follows:

1. Media expert

The results of the media expert are shown in Table 3.

<table>
<thead>
<tr>
<th>Aspect Evaluation</th>
<th>Mark</th>
<th>Percentage</th>
<th>Qualification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cover design</td>
<td>10</td>
<td>83%</td>
<td>Excellent</td>
</tr>
<tr>
<td>Writing</td>
<td>16</td>
<td>100%</td>
<td>Excellent</td>
</tr>
<tr>
<td>Content</td>
<td>16</td>
<td>100%</td>
<td>Excellent</td>
</tr>
<tr>
<td>Design</td>
<td>16</td>
<td>100%</td>
<td>Excellent</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>14.5</strong></td>
<td><strong>96%</strong></td>
<td><strong>Excellent</strong></td>
</tr>
</tbody>
</table>

Based on the table above, results validation from media experts relate to aspects of evaluation design E-Comic media cover, writing, content E-Comic, and design E-Comic. Learning media, This E-Comic gets its percentage level appropriateness, 96%, with a decent or good classification. Evaluation obtained from aspect design cover E-Comic gets a percentage of 83%. Writing gets a percentage of 100% with a classification of very decent or very good; filling in E-Comic gets 100% very decent or perfect; and E-Comic design gets 100% very decent or perfect. Assessment by media experts of aspect design cover E-Comic, item evaluation cover E-Comic describe fill get score 4, item evaluation shape, color, font, and size cover proportional and cover The evaluation score for E-Comic is 3. Assessment score three was obtained because there is a weakness in the visualization cover of the E-Comic that needs to be optimally developed. That was indicated by the poor choice of font in the title, which was caused by the font needing to be more formal.

Fonts are a complete collection of letters, symbols, numbers, and characters with specific characteristics or sizes. The font in design is essential because if it does not exist, it can cause the design to be challenging To understand (Musnur & Faiz, 2019). Apart from fonts, the display type is also essential to notice in election fonts. The display type is
election letters used in determining a title so you can attract riveting attention and be more naturally persuasive. Another assessment of design covers comics relating to weaknesses in the judgment of E-Comic that still need to be done by exploring more. Explore what you can do by positioning characters with certain activities so the expression of characters developed can be more enjoyable. Character expression is essential in the story comic and aims to build emotional readers (Musnur & Faiz, 2019). In aspect writing, I scored four on each item evaluation because this e-comic is a text that is easy to read, the cohesiveness between colors and text is OK, layout consistency is good, and the presentation of the image layout is appropriate. In some aspects, fill E-Comic, cast or characters E-Comic own proportional number, cast E-Comic describe story according to the material's content, plot story E-Comic interesting and plot story E-Comic easily understood.

On assessment aspect design, E-Comic scored four on the item evaluation presentation. QR Codes are attractive and appropriate, the quality picture is good, and the material content and the systematic presentation of the E-Comic is good. This e-comic has prominent advantages, namely in aspect writing. Excess them because assessment of items evaluation cohesiveness between color with text good Because the quality color in This e-comic has good quality and color bright. That can be reinforced by assessing the item's cohesiveness color with content text, getting a score of 4. Overall, this E-Comic assessment is good enough and interesting, so the E-Comic Contextual equipped QR Code on Management Materials Indonesia's Natural Resources is declared worthy of testing in the field without revision. Based on the media expert's suggestions, some things need to be fixed, as shown in Figure 5.

![Figure 6. Cover E-Comic before revision (a) and cover E-Comic after revision (b)](image)

2. Material expert

   The results of the media expert are shown in Table 4.

<table>
<thead>
<tr>
<th>Aspect Evaluation</th>
<th>Mark</th>
<th>Percentage</th>
<th>Qualification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presentation technique</td>
<td>23</td>
<td>72%</td>
<td>Good or decent</td>
</tr>
</tbody>
</table>
Based on the results of material validation, the material in this E-Comic is included in a category worthy of testing with revisions. In aspect evaluation technique presentation including category deserve and get a percentage of 72%, use approach contextual by 69% by category worthy. This e-comic needs to be more expansive in learning media. E-Comic is only limited to management material source Power Indonesian nature, namely in the potential and distribution sub-materials material mine, deep this is material mine discussed about material limestone mine so that students do not have enough knowledge regarding potential material and distribution material mine as a whole. Material experts evaluate things that need to be added and improved, including 1) cutting panels unrelated to the material and 2) adding KI and KD.

a. Amount page

Learning media validation results E-Comic to material experts, getting the suggestion that the intro on E-Comic is too long and not related to the material, so there are several amounts page beginning in the E-Comic was reduced so that the intro was used necessarily as needed in fill story E-Comic. Among the comics that were developed previously, there are 46 pages. However, the number of pages was reduced as many as seven to 39 pages, as shown in Figure 7. Reductions made that are against channel stories that are not related to the material. Storyline previously discussed Haruka's character and Loly's character visiting Haruka's house and playing together, so on to the deleted story because it is unrelated to the material. Inner page This E-Comic is done subtraction. The aim is for the story to be used related to management material and Indonesian natural resources.

![Figure 7](image)

**Figure 7.** Total of page E-Comic before revision (a) and total of page E-Comic after revision (b)

b. Adding KI and KD

Based on results validation from material expert validators, get suggestions for adding KI and KD pages, so on page after instruction, use E-Comic so added KI and KD based on suggestions from material expert aims for improving learning media E-Comic, shown in Figure 8. This E-Comic is also available for question evaluation. However, the
author did not add question internal evaluation _ E-Comic because question evaluation was placed outside or separated from the fill story E-Comic.

![Image of adding KI & KD](image)

**Figure 8.** Image of adding KI & KD

c. Linguist

The results of language validation are shown in **Table 5**.

**Table 5.** Language validation results

<table>
<thead>
<tr>
<th>Aspect Evaluation</th>
<th>Mark</th>
<th>Percentage</th>
<th>Qualification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language Truth</td>
<td>22</td>
<td>92%</td>
<td>Very good or very decent</td>
</tr>
<tr>
<td>Clarity and readability of content</td>
<td>11</td>
<td>92%</td>
<td>Very good or very decent</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>16.5</strong></td>
<td><strong>92%</strong></td>
<td><strong>Very good or very decent</strong></td>
</tr>
</tbody>
</table>

Validation from expert language shows that learning media from E-Comic has a fulfilling level of appropriateness of 92% with very decent or excellent qualifications. Evaluation aspect Language got an average result of 92%, with 92% assessment on clarity and readability of E-Comic. Learning media, this e-comic can tested with revisions based on results evaluation from expert validator language. Based on suggestions from expert validators, Language is to pay attention to writing, especially in the use of sign reading, conjunctions, standard words, and spelling in the development of E-Comic, as shown in **Figure 9**. Improvements that need to be made are repairing writing to comply with PUEBI in writing sign reading, using conjunctions, using standard words, and spelling. The application of correct language is always related to spelling. Spelling as whole pronunciation symbols sound utterances containing words or sentences that mean certain things orally or in writing.
3. Eligibility test

Table 6. Teacher Eligibility Test Results

<table>
<thead>
<tr>
<th>Aspect Evaluation</th>
<th>Mark</th>
<th>Percentage</th>
<th>Qualification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presentation technique</td>
<td>23</td>
<td>96%</td>
<td>Very good or very decent</td>
</tr>
<tr>
<td>Presentation of Material</td>
<td>25</td>
<td>89%</td>
<td>Very good or very decent</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>24</strong></td>
<td><strong>93%</strong></td>
<td><strong>Very good or very decent</strong></td>
</tr>
</tbody>
</table>

Due diligence carried out to teachers to obtain assessment on aspect technique presentation amounted to 96%. In contrast, in aspect material presentation, it was 89%. Overall, _ obtained a 93% value in the Very Worthy category. An assessment with a score of 93% was obtained by using contemporary learning media development of science and technology, learning media own the appearance is attractive, and the language used is suitable. However, I got a score of three due to the poor layout, which was interesting. Layout or layout is a huge need. The layout can be done by giving a mark alone and can _ interpreted by readers. Comments and suggestions were obtained from the geography teacher of SMAN 1 Sampung For multiple development E-Comic with another theme because it is beneficial to students in understanding the material.

Table 7. Feasibility Test Results Student

<table>
<thead>
<tr>
<th>Aspect Evaluation</th>
<th>Mark</th>
<th>Percentage</th>
<th>Qualification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media Attraction</td>
<td>211</td>
<td>88%</td>
<td>Very good or very decent</td>
</tr>
<tr>
<td>Material Suitability</td>
<td>286</td>
<td>89%</td>
<td>Very good or very decent</td>
</tr>
<tr>
<td>Media Influence</td>
<td>358</td>
<td>89%</td>
<td>Very good or very decent</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>24</strong></td>
<td><strong>88.66%</strong></td>
<td><strong>Very good or very decent</strong></td>
</tr>
</tbody>
</table>

The table above shows the product tested on XI IPS 1 students and a spread questionnaire against 2 0 students. Evaluation is done on three aspects: material presentation, appearance, and presentation benefits. The evaluation of facet media interest yielded 88%, facet material suitability 89%, and facet media influence 9%. In terms of the presentation of student material, the material presented is easy to understand because it uses simple sentences and communicative language. According to the assessment, that is the student aspect of the presentation of material, namely by 90%, i.e., including the “outstanding” category. Evaluating students as a whole about developing this e-comic is good. However, there are several suggestions and comments from students. If the language is too complicated and
recommended for developing product *E-Comic*, it leads to Japanese "manga" to make it interesting. Development This *e-comic has been* adapted to the language daily and based on suggestions from validators, namely expert language. However, researchers cannot change *E-Comic* according to student suggestions because the "manga" with which *E-Comic* was developed have different genres.

4. Product trial

A product trial was done for class XII IPS 1 SMAN 1 Sampung students. The research design for product trials uses a pre-experimental design, one group pretest-posttest. At this stage, initial testing was carried out or pretested before giving treatment. The treatment used in this research is the discussion method. This discussion was carried out by giving students an article containing problems regarding mining in the students’ surroundings. Students are asked to read and observe the article's contents and discuss it with friends. After that, each group explained what problems were occurring and what the impact was. The trial stage was also carried out using a pretest before treatment, and a post-test treatment was carried out to measure the effectiveness of the learning media when used by students. This can be seen based on student learning outcomes.

Based on the trials, the average pretest results were 53%, and post-test results were 79%. A total of 18 students got scores that met the KKM, while two got scores below the KKM. Students who score below the KKM experience difficulties on item 5 of the posttest. Regarding point 5, students are directed to analyze appropriate mining management based on the principles of sustainable development. Based on Vygotsky's theory, the learning stage with obstacles can be adjusted to assist friends or teachers in overcoming obstacles to learning.

### Table 8. Normality Test Results

<table>
<thead>
<tr>
<th>Test of Normality</th>
<th>Kolmogorov-Smirnov</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistics</td>
<td>df</td>
</tr>
<tr>
<td>Pre Test</td>
<td>.170</td>
<td>20</td>
</tr>
<tr>
<td>Post Test</td>
<td>.182</td>
<td>20</td>
</tr>
</tbody>
</table>

Based on normality test results that have been done, it can be known that the pretest sig value was 0.375, and the posttest pretest was 0.117. Results data normality test table sig value. On the y variable, namely 0.097, it can concluded that the research hypothesis is accepted and the data is normally distributed because H0 is accepted; then, the research can be carried out using a *paired-sample t-test*. The data is normally distributed, which means the data's pattern is symmetrical or has normal data distribution so it can analyzed analytically.

### Table 8. Normality Test Results

<table>
<thead>
<tr>
<th>Paired Differences</th>
<th>95% Confidence Interval of the Difference</th>
<th>Upper</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1</td>
<td>Pre-Test – Post-Test</td>
<td>-23.417</td>
<td>-16.797</td>
<td>19</td>
<td>.000</td>
</tr>
</tbody>
</table>
Andarukmi, dkk

The paired sample t-test is a stage for knowing the difference in the means of two sample pairs. The meaning is the same subject or sample in two sample pairs but has data differences. The paired sample t-test is a stage for the effectiveness of learning media developed by E-Comic. Table analysis paired sample test produces big data of .000. That shows that sig value. Not enough from Mark is significant, and it is possibly concluded that H0 is rejected and H1 is accepted. Analysis of the data results is by the hypothesis researcher that there exists a significant difference or difference in the pretest average score with the score average post-test, so it can be concluded that the data _ own influence on results Study geography students management material source Power Indonesian nature, especially in sub- chapter potential and distribution material mine.

Product E - Comics developed in this research have excess that can be accessed flexibly because they are packaged digitally; they can be accessed anywhere and anytime. This e-comic has another advantage: it provides up-to-date examples based on contextual approaches. Weaknesses of learning media: This e-comic requires an internet network to access E-Comic. The materials used are not discussed as potential and distribution source Power in other realms, but only limited to material potential and distribution source Power goods mine. Internal material in this e-comic must be deepened based on a contextual approach.

CONCLUSION

Based on research results and discussion, it can concluded that learning media products E-Comic based contextual be equipped QR Code on management materials source Power Indonesian nature can used in activity learning. This e-comic was developed using the ADDIE model. Average results validation learning media products E-Comic by 96% and included in the very feasible category; material validation is 71% by category worthy validation Language amounting to 92% with the very feasible category. Product E-Comic has been validated, corrected, and perfected based on suggestions from expert validators. Product E-Comic is a learning medium in the very category. That thing can proven by the results of trial activities for students, which amounted to 89%, and due diligence for teachers, which amounted to 90%. Excess E-Comic can be accessed without an application, is Accessible flexibly, and includes up-to-date examples based on a contextual approach.

This e-comic has excess that can be accessed flexibly and has been providing up-to-date examples regarding problems related to Sari Gunung mining. The weakness of this E-Comic is that the material used is limited in potential and distribution source Power goods mine. This E-Comic also has another drawback: the need for an internet network to access the E-Comic. Researchers furthermore recommended developing learning media to overcome problems with the limitations of learning media. Product: The development of learning media only discusses the potential and distribution of material mining. In contrast, the main material management source, Power Indonesian nature, is a developed Lots material mine. This encourages researchers to suggest to researchers further deepening learning media development material E-Comic based contextual.
REFERENCES


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