International Journal of Social Learning
December 2025, Vol. 6 (1), 47-68
e-ISSN 2774-4426 and p-ISSN 2774-8359
DOI: https://doi.org/10.47134/ijsl.v6i1.464

Development of Website-Based KOMIK ALAM (E-comic Utilization of Natural Resources) as Social Studies Learning Media

Qonita Rahma Zahira[1], Neni Wahyuningtyas[2*], Ravinesh Rohit Prasad[3]

[1,2]*Universitas Negeri Malang, Indonesia*
[3]*Fiji National University, Fiji*

*e-mail: neni.wahyuningtyas.fis@um.ac.id

ABSTRACT

The use of e-comics in social studies learning is gaining popularity due to their ability to convey concepts visually. However, students still face difficulties in understanding the material, as e-comic storylines are often not contextual and do not present real-world problems. This study aims to develop KOMIK ALAM, a website-based e-comic learning media focused on natural resource utilization for Grade VIII students at MTs Negeri 2 Malang City. The research employs an R&D method utilizing the Design Thinking development model, which encompasses four stages: empathize, define, ideate, and prototype. The study focused on prototype development without proceeding to the test stage. Validation from subject and media experts, as well as a readability test with students, indicated that KOMIK ALAM is highly feasible. KOMIK ALAM is expected to serve as a visual and interactive learning media that presents contextual content and real problems to support diverse learning styles and increase student engagement. Future research should examine its effectiveness through experimental methods.

***Keywords*:**

E-comic; Website; KOMIK ALAM; Learning Media; Social Studies Learning.

ABSTRAK

Penggunaan e-comic dalam pembelajaran IPS semakin populer karena kemampuannya menyampaikan konsep secara visual. Namun, siswa masih mengalami kesulitan memahami materi karena alur cerita e-comic yang kurang kontekstual dan belum menghadirkan masalah nyata. Penelitian ini bertujuan untuk mengembangkan KOMIK ALAM, media pembelajaran e-

Submitted: 2025-04-09; Accepted: 2025-07-05; Published: 2025-12-08
***Corresponding author:** neni.wahyuningtyas.fis@um.ac.id

comic berbasis website yang berfokus pada materi pemanfaatan sumber daya alam untuk siswa kelas VIII di MTs Negeri 2 Kota Malang. Penelitian ini menggunakan metode R&D dengan model pengembangan Design Thinking, yang mencakup tahapan empathize, define, ideate, dan prototype. Penelitian ini difokuskan pada tahap pengembangan prototype tanpa melanjutkan ke tahap test. Hasil validasi dari ahli materi dan media serta uji keterbacaan oleh siswa menunjukkan bahwa KOMIK ALAM sangat layak digunakan. Melalui KOMIK ALAM, diharapkan dapat menjadi media pembelajaran visual yang interaktif, memuat materi kontekstual, dan menyajikan masalah nyata untuk mendukung gaya belajar beragam serta meningkatkan keterlibatan siswa. Saran untuk penelitian selanjutnya yaitu menguji efektivitas media melalui metode eksperimen.

***Kata kunci*:**

E-comic; *Website*; KOMIK ALAM; Media Pembelajaran; Pembelajaran IPS.

1. Introduction

Social studies is a core subject taught at the Junior High School level, encompassing multidisciplinary content, including geography, history, sociology, and economics. One of the most essential components is geography, particularly the study of natural environments and how these produce valuable resources for society (Handoyo et al., 2024). At the Grade VIII level, students study natural resource utilization, which includes the potential of forests, mines, and maritime areas across the Indonesian archipelago. This material is aligned with the Merdeka Curriculum's Phase D Learning Outcomes, which emphasize understanding Indonesia's geographic characteristics and the sustainable use of its resources.

Learning about the utilization of natural resources is important because it provides students with the knowledge and awareness needed to manage these resources responsibly. Students are expected to understand the relationship between nature and society and how human activities impact the environment. This topic also supports environmental literacy and contributes to informed, responsible decision-making in everyday life (Pan & Hsu, 2020). However, in practice, this material presents notable challenges in classroom learning.

Numerous studies and field observations have confirmed that natural resource content is often difficult for students to understand (Wahyuningtyas & Idris, 2020). One contributing factor is the abstract nature of the concepts being taught. According to Marougkas et al. (2023), students often find it difficult to relate theoretical knowledge about resources to real-life experiences. Furthermore, this topic falls within the C2 (understanding) to C4 (analyzing) cognitive domain, which involves complex reasoning and application skills. Endres et al. (2023) also noted that these cognitive demands require integration with prior knowledge, making it even more challenging for students to fully grasp the material.

Other issues stem from how the subject is delivered in schools. Many teachers continue to rely on traditional lecture-based approaches and textbooks, particularly those that emphasize exercises

without much context (Li et al., 2022). These textbooks often focus more on repetitive practice than on meaningful explanation, making the learning experience rigid and unengaging especially for students who struggle to visualize the material. Theoretical and decontextualized content delivery hinders comprehension, particularly in subjects that would benefit from concrete, real-world examples.

Perguna et al. (2020) explained that a lack of contextual presentation and interesting learning tools contributes to students' weak understanding. Moreover, the current use of teaching media in many schools remains static and non-interactive. Teachers rarely adopt multimedia tools or interactive methods that suit diverse learning styles. Kurniawan et al. (2023) emphasized that the lack of variety in learning media has not fully accommodated students' diverse learning styles. As a result, many students often become disengaged or lose interest in the learning material.

Furthermore, teacher limitations in integrating appropriate methods and digital resources make the learning process even more difficult. Purnomo et al. (2020) reported that many teachers have not yet optimized the use of information and communication technology in the classroom. The lack of digital media makes it harder for students to visualize the material, especially when dealing with abstract or complex concepts related to natural resources. In this context, an innovative and student-centered solution is urgently needed.

E-comics represent one promising solution. As a learning medium, e-comics combine narration, visual storytelling, and interactivity to make learning more engaging and meaningful (Apostolou & Linardatos, 2023). The narrative element of comics, supported by appealing illustrations, helps students follow a storyline while understanding the core message. Instead of reading long blocks of text, learners engage with character dialogue, scenarios, and visual cues. This approach can simplify the presentation of broad or complicated topics, especially when content needs to be contextualized in real life.

Recent years have seen rapid growth in the use of e-comics in education. Fitria et al. (2023) showed that e-comics help learners comprehend abstract ideas by providing visual illustrations that support the text. Students can imagine, analyze, and relate the content more effectively. Mamolo (2022) observed that e-comic media makes students more motivated and happy to learn. Fabillar et al. (2024) also found that e-comics can enhance both student interest and academic achievement. Through well-structured visual stories, students not only absorb information more easily but also retain it longer.

Although some previous studies have examined the integration of e-comics into learning, many still focus on delivering static material. For example, Malik & Ginanjar (2023) developed a PDF-based e-comic uploaded via Google Drive. While functional, this format lacks interactivity and multimedia integration. Similarly, Siregar et al., 2024 created e-comics using Heyzine Flipbook, but without incorporating features like videos or quizzes. Indriani & Sakti (2022) designed an e-comic integrated with a worksheet (LKPD), but it still lacked fully interactive components that enhance understanding and engagement.

These studies generally do not embed real-life problems into their storylines or integrate multiple media elements in one cohesive platform. In contrast, the present study seeks to close this gap by developing an e-comic learning medium that is interactive, multimodal, and narrative-based.

The design of this product follows Edgar Dale's Cone of Experience theory, which states that students learn more effectively through active engagement and concrete experiences (Johansen, 2023). Perez (2022) also noted that combining diverse learning elements such as audio, visuals, and interaction can strengthen memory and increase student participation.

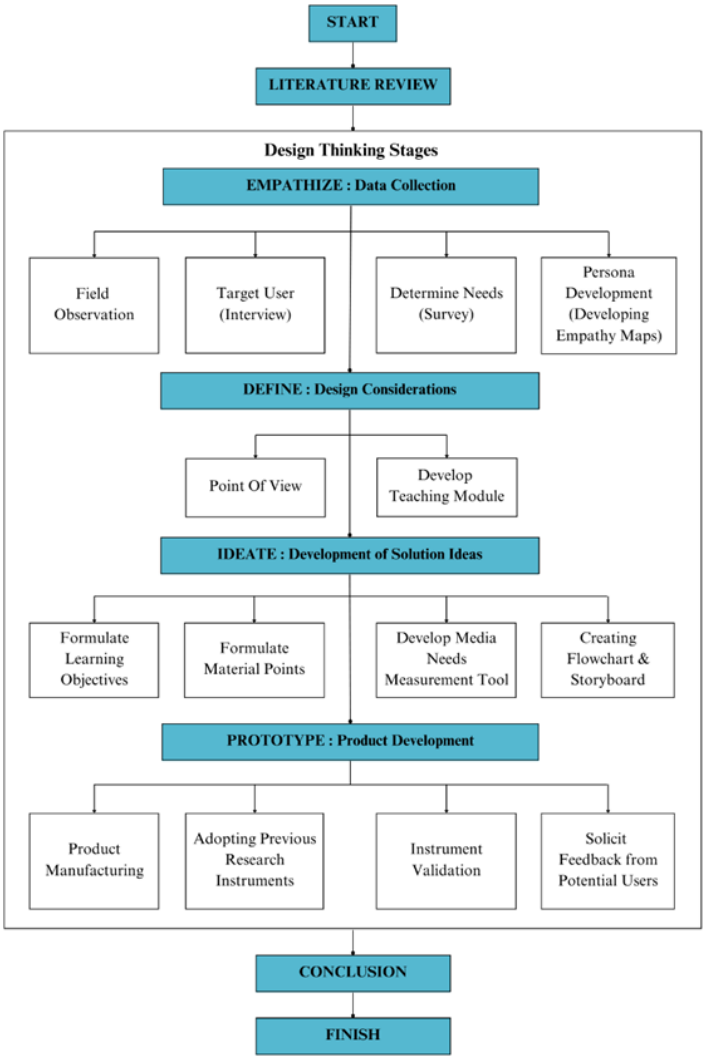
Observations and needs analysis of Grade VIII students at MTs Negeri 2 Malang City revealed a strong preference for interactive and digital-based learning media. Of the 30 students, 18 identified as visual learners, 7 as auditory, and 5 as kinesthetic. Many students expressed the need for e-comic media that includes not only illustrated stories but also supporting features such as learning videos and interactive quizzes to aid comprehension. The current main resource, the Bupena textbook, focuses more on practice questions than on concept explanation, making it less engaging and harder for students to grasp complex topics like Natural Resource Utilization. Limited teaching strategies and a lack of varied media also hinder understanding. In contrast, when materials were delivered through audiovisual formats, students showed greater enthusiasm, indicating that digital-based approaches are more effective in supporting student engagement and comprehension.

Based on these findings, the current research aims to develop KOMIK ALAM (E-comic Utilization of Natural Resources), a website-based learning media tailored for Grade VIII Junior High School students. KOMIK ALAM integrates multiple components Flipbook-based e-comics, YouTube learning videos, interactive worksheets via Liveworksheet, and online quizzes using Genially into one centralized and user-friendly platform. Through this approach, students are expected to experience a more interactive, contextual, and enjoyable learning process. By presenting material in a structured narrative format and integrating multimedia elements, KOMIK ALAM not only addresses gaps in previous studies but also aligns with the learning preferences of today's digital-native students. This research offers an innovative and practical contribution to social studies learning and supports better engagement, understanding, and retention especially in complex topics such as natural resource utilization.

2. Methods

2.1 Development Model

This research method uses Research and Development (R&D). R&D is a research method that produces certain product innovations while testing the effectiveness of the products developed (Sugiyono, 2020). The KOMIK ALAM learning media development model uses Design Thinking. Design Thinking is a series of processes to create a balance of creative problem solving and focus on needs based on priorities that have been identified before making innovations (Muslihati et al., 2018). The Design Thinking development model consists of 5 stages, namely empathize, define, ideate, prototype, and test (Dam, 2025). However, this research only uses four stages without conducting a test because the focus of the research is to produce a prototype. The procedure in this research and development is as shown in Picture 1.



Picture 1. Flowchart of R&D Design Thinking Model. Source. Adaptation (Dam, 2025)

In stage 1) Empathize aims to analyze problems and user needs by collecting supporting data as the basis for developing learning media for KOMIK ALAM through observations, interviews, determining the needs of materials and students through surveys, and compiling empathy maps. Stage 2) Define aims to consider the design of KOMIK ALAM learning media according to the point of view of the problem, need, and insight. After formulating the point of view, namely compiling teaching modules according to the characteristics of students. Stage 3) Ideate aims to design the development of KOMIK ALAM media by determining learning objectives, compiling core material, preparing media success measurement tools, and compiling flowcharts and storyboards. Stage 4) Prototype aims to develop KOMIK ALAM learning media based on the results of validation by material validators and media validators and revision of previous products. The product developed in this study adopted previous research instruments by (Alfania et al., 2024) to ensure validity and reliability in evaluating the effectiveness of learning media products. Furthermore, it establishes

feedback as a readability test for the learning media KOMIK ALAM to students after the validation process is declared valid by the validator.

2.2 Product Trial

The trial design used was a formative evaluation with a one-shot case study approach for the readability test. Formative evaluation is conducted to improve and perfect the media before it is widely used. The stages in the formative evaluation include validation tests conducted by material validators and media validators, as well as readability tests conducted by students. The subject of the readability test for KOMIK ALAM involved one group of students, specifically class VIII H at MTs Negeri 2, Malang City. In this design, students were given the KOMIK ALAM media to provide feedback on readability, understanding, and to ensure the feasibility of the product before it was applied more widely.

2.3 Types of Data

The types of data collected include qualitative data and quantitative data. Quantitative data are presented in the form of validation questionnaire results, using a Likert scale, which evaluate aspects of the material and presentation of the learning media. In addition, quantitative data is also obtained from the practicality of learning media based on students' responses in using KOMIK ALAM. The qualitative data are in the form of observation results, interviews, criticisms, and suggestions from material validators, media validators, and students, serving as a reference for product improvement. Furthermore, the data obtained from the validation questionnaire will be analyzed by converting it into a 4-point Likert scale.

2.4 Data Collection Technique

The data collection technique used was a questionnaire given to material validators and media validators in the form of a validation sheet. Additionally, the questionnaire was also administered to students of Class VIII at MTs Negeri 2, Malang City, as part of the product readability test. The questionnaire addressed to the respondents was used to assess the feasibility of using the KOMIK ALAM product and as revision material if there were criticisms or suggestions for improvement.

2.5 Data Collection Instruments

The data collection instruments used were open questionnaires and closed questionnaires. The use of this instrument aims to obtain feasibility assessment data from material validators, media validators, and student responses related to the utilization of KOMIK ALAM in learning. Open questionnaires as a stage in the introduction to the study in order to obtain a composition of question items that are part of a closed questionnaire (Fajri & Sutrisno, 2020). The open questionnaire as a measure of media feasibility is reviewed from several aspects, namely display organization, language use, material presentation, software engineering, exercise questions, and learner responses when using KOMIK ALAM.

After the open questionnaire is distributed, the mode of the respondent's answer will be obtained. The results of the mode of answers will be arranged in a closed questionnaire which will then be developed and adjusted into research variables and use an interval scale as a rating scale (Fajri & Sutrisno, 2020). In using a closed questionnaire, respondents have the opportunity to consider the answers to the questions according to their respective choices. This questionnaire uses a Likert scale with intervals of 1-4 as shown in Table 1.

Table 1. Likert Scale Conversion

Category	Score
SS (Strongly Agree)	4
S (Agree)	3
TS (Disagree)	2
STS (Strongly Disagree)	1

2.6 Data Analysis Technique

The data analysis technique is carried out after getting the total score from the validation questionnaire then finding the percentage to determine the level of product feasibility using the following formula:

$$P = (\Sigma x / \Sigma xi) \times 100$$

Picture 2. Frequency Distribution Formula

Description:

P = Validity Percentage
X = Assessment score in one item
Xi = Ideal Assessment score in one item
100% = Constant

After determining the results of the validation calculation, the product eligibility criteria in Table 2 are adjusted accordingly.

Table 2. Media Feasibility Criteria

Percentage	Criteria	Category
81-100 %	Very Feasible	No Revision
61-80 %	Worth	Minor Revision
41-60 %	Decent Enough	Revised
21-40 %	Less Feasible	Partial Revision
1-20%	Very Less Feasible	Revision Total

Source. Adaptation (Suharsimi, 2020)

Learning media can be declared feasible if it achieves a percentage score of more than 60%. If the score is less than 60%, the media must be revised and revalidated.

3. Results and Discussion

This research and development produced a website-based learning media called KOMIK ALAM (E-Comic on Natural Resource Utilization), designed to be accessed through web browsers using computers or smartphones. KOMIK ALAM integrates various multimedia learning components, including e-comics, contextual storylines, instructional videos, interactive worksheets (LKPD), and quizzes, all embedded into a single Google Sites platform. The learning experience provided by KOMIK ALAM is aligned with real-world environmental contexts, enabling students to explore the material in a more meaningful way. This media is specifically developed for Grade VIII students and aims to support the achievement of learning outcomes related to the topic of natural resource utilization. All content is designed to accommodate diverse learning styles, including visual, auditory, and kinesthetic, while promoting independent and interactive learning. The final product, which can be accessed via the provided site link, is named "KOMIK ALAM."

3.1 The Stages of Developing Website-Based KOMIK ALAM (E-Comic on Natural Resource Utilization) as Social Studies Learning Media

The research and development of KOMIK ALAM employed four stages of research, adopting the Design Thinking model: empathize, define, ideate, and prototype.

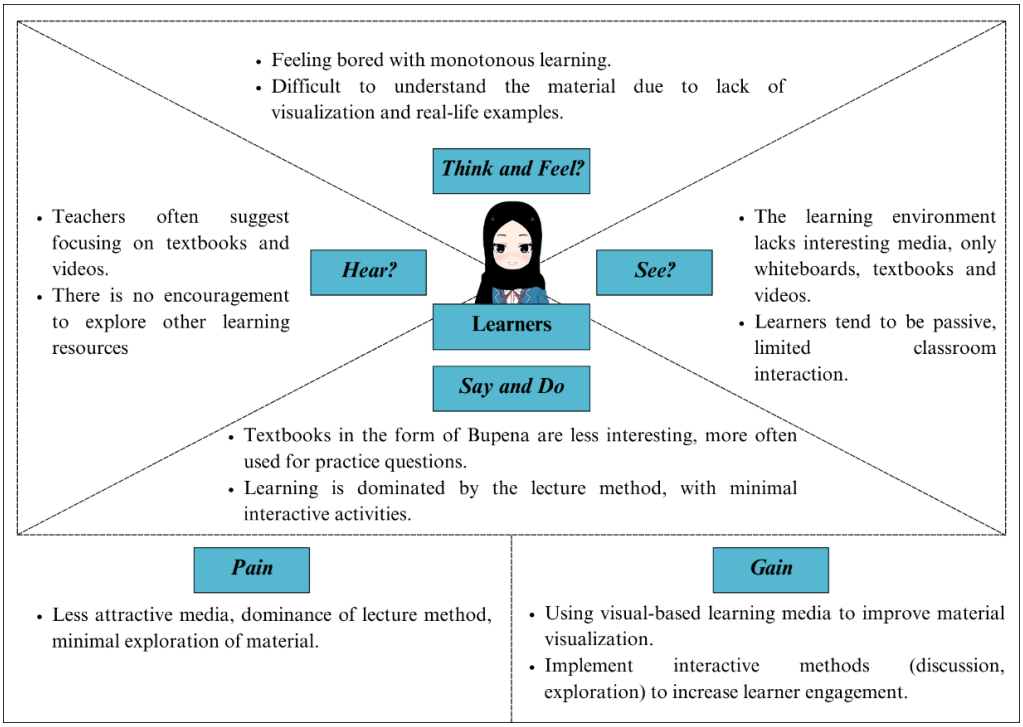
3.1.1 Empathize Stage

The empathize stage aimed to identify the core problems and learning needs of students by conducting observations, interviews, a needs analysis, and developing learner personas. Field data collected at MTs Negeri 2, Malang City, showed that social studies instruction in Grade VIII heavily relies on textbooks, particularly Bupena, which tends to be generic and lacks interactive content. Teachers primarily use traditional lecture methods, while visual and technological resources remain underutilized. These findings are significant as they underscore a disconnect between conventional teaching practices and the evolving learning preferences of students in the digital era.

Textbook-based learning, especially with static, two-dimensional illustrations, has been criticized for its inability to present dynamic, real-world contexts (Rahmah et al., 2022; Zuo et al., 2023). The result is a passive learning environment where students struggle with abstract and complex topics such as natural resource utilization which lie within higher cognitive domains (C2–C4) and demand contextual understanding and analysis. This reinforces Edgar Dale's Cone of Experience, which emphasizes that students learn more effectively through direct, visual, and interactive experiences compared to abstract verbal instruction (Rifdarmon et al., 2024; Saputri et al., 2024). This condition aligns with prior research, but our study strengthens these findings by providing firsthand qualitative data that confirms persistent misconceptions among learners when exposed to theory-heavy content with minimal visual or contextual reinforcement.

What differentiates this study is the systematic linkage between learning barriers and student learning styles. Based on the non-cognitive diagnostic survey, the majority of students (18 of 30) exhibit a dominant visual learning style, while others prefer auditory (7 students) and kinesthetic (5 students) modes. These findings validate the theoretical premise that multimodal learning approaches are essential in meeting the diverse needs of students (Meda & Waghid, 2022; Philippe et al., 2020). From a practical standpoint, these results underscore the importance of developing learning media

that not only accommodate various learning modalities but also integrate real-life scenarios to bridge conceptual gaps in the curriculum.



Picture 3. Empathy Map

Through the development of learner personas and an empathy map, it became evident that students felt disconnected from the material due to monotonous methods and limited visual aids. This insight supports the use of digital visual media such as e-comics, which combine narrative, illustration, and interactivity. The pain-and-gain mapping further revealed that learners are more likely to achieve intended outcomes if the media provides concrete, localized examples, supports visual exploration, and utilizes accessible technology platforms.

Therefore, this research contributes a novel approach by proposing KOMIK ALAM, a website-based e-comic that not only delivers content visually but also strategically aligns with students' cognitive challenges and learning preferences. Unlike previous studies that focused only on static comics or PDF-based content (Malik & Ginanjar, 2023). This project advocates for a fully integrated, multimodal digital solution that facilitates deeper learning while addressing existing gaps in social studies pedagogy.

3.1.2 Define Stage

The define stage aims to consider the learning media design from the perspective of the problem, need, and insight. The technical point of view (POV) is as in the following table.

Table 3. Point of View

No	Problem	Learner Need	Media Design Insight
1	Visual learning styles are not facilitated	Engaging visual media	E-comic with illustrations and narratives

2	Low learner engagement	Interactive learning approach	Story-based E-comic to increase participation
3	Limited learning media	Diverse media alternatives	E-comic as a visual and engaging option
4	Underused digital devices	Technology-integrated learning	Digital-based E-comic for flexible access
5	Textbook-only content	Contextual real-life examples	E-comic linking concepts to daily situations

Based on the previous empathize phase, it is evident that students require learning media that align with their dominant visual learning style and offer a more interactive experience than conventional methods. Therefore, the researchers designed a website-based learning media called KOMIK ALAM (E-comic on the Utilization of Natural Resources), which integrates core materials in e-comic form to accommodate visual learners. Additionally, the media features video content tailored for auditory learners, as well as interactive worksheets (LKPD) and quizzes designed for kinesthetic learners.

The rationale behind selecting e-comics as the primary medium lies in their ability to combine visual storytelling with contextual narration, making abstract content more accessible. This aligns with Dale's Cone of Experience theory, which emphasizes the effectiveness of multimedia-based learning for better knowledge retention. Moreover, research by Capone & Lepore (2022) underscores that interactive digital learning fosters user engagement and reduces boredom, which supports the theoretical foundation for this development.

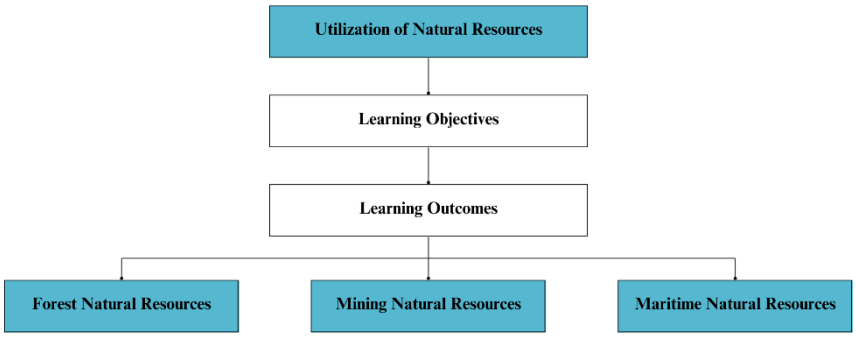
To bridge theory and practice, the KOMIK ALAM website serves not only as a media platform but also as a multi-modal learning ecosystem, integrating Flipbook-based comics, YouTube videos, Liveworksheet LKPD, and Genially-powered quizzes. This integrated approach distinguishes the current study from previous research, which often focused solely on static comic formats (e.g., PDF-based e-comics or limited Flipbook implementations without learning tasks). By embedding various components tailored to students' learning modalities, this media aims to enhance comprehension, participation, and student autonomy in navigating complex topics such as natural resource utilization.

Before entering the ideate stage, the researchers compiled a conceptual teaching module to ensure that the learning design was coherent with students' cognitive levels (C2–C4) and the thematic complexity of the topic. The selection of "Utilization of Natural Resources" as the core material is grounded in its interdisciplinary nature and relevance to students' real-life contexts, providing an ideal foundation for narrative-based, contextualized learning via e-comics. This strategic design step strengthens the theoretical underpinning of the research and establishes its novelty in combining visual storytelling with integrated digital pedagogy for Junior High School social studies education.

3.1.3 Ideate Stage

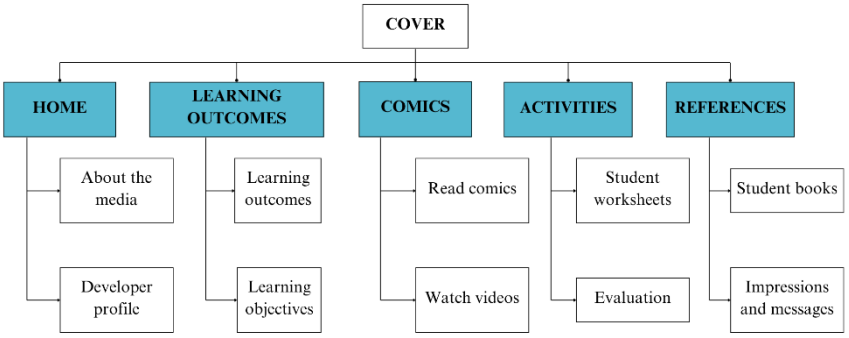
In the ideate stage, the development of KOMIK ALAM was strategically designed to align with the students' learning needs identified in the define phase, particularly the need for a media format that supports various learning styles and simplifies complex material. The learning media integrates e-comic and educational video content as primary resources, offering both visual and auditory reinforcement to aid material comprehension. Additionally, the product includes interactive

worksheets (LKPD) and quizzes to provide kinesthetic engagement and formative evaluation.



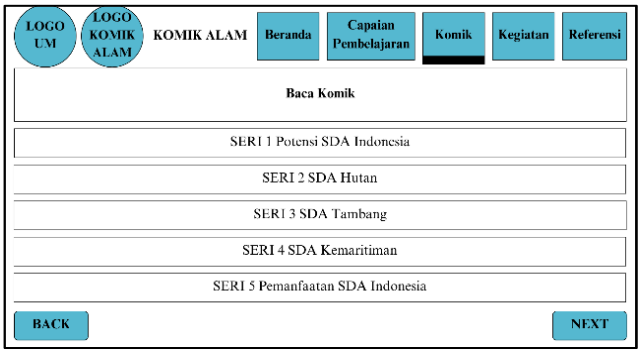
Picture 4. Material Coverage

This integrated approach is grounded in Edgar Dale's Cone of Experience theory, which emphasizes that learning is most effective when learners engage directly with rich, multi-sensory experiences (Palmieri et al., 2020; Gastar & Linaugo, 2022). By combining visual narration (through comics), auditory delivery (through video), and active participation (through LKPD and quizzes), KOMIK ALAM moves beyond abstract verbal symbols (e.g., textbook reading or lectures) into more concrete and immersive learning experiences. This ensures that the material on natural resource utilization, which often involves abstract and systemic concepts, becomes more accessible and meaningful for Junior High School learners.



Picture 5. Flowchart

Picture 5. shows design of KOMIK ALAM also incorporates a structured digital learning environment using Google Sites. The platform integrates all components into a unified interface organized through headers, sidebars, content areas, and footers to ensure seamless navigation. This format not only supports ease of access but also promotes student autonomy in learning outside the classroom. A detailed flowchart and storyboard were developed to map the learning experience and user interactions within the media, ensuring alignment between learning goals and digital features. These can be accessed via Storyboard KOMIK ALAM.

View	Description
	The Read Comics page appears when the user presses the Comics menu or the Read Comics submenu. The contents contained on this page are a. University Logo and KOMIK ALAM b. Title page c. Home Menu, Learning Outcomes, Comics, Activities, and References d. A selection of materials in the form of 5 e comic series e. Back and Next buttons

Picture 6. Storyboard

Unlike previous research, which often treated e-comic merely as passive visual aids in PDF or Flipbook formats, this study advances innovation by embedding the e-comic within an interactive, multi-component website. The novelty of this research lies in its integration of diverse media elements tailored to Dale's hierarchy of experiential learning, offering students concrete, engaging, and participatory experiences that facilitate better internalization and application of complex social studies content. This design choice reflects a shift from content delivery toward learner-centered digital interaction, offering both theoretical contribution and practical relevance for modern educational settings.

3.1.4 Prototype Stage

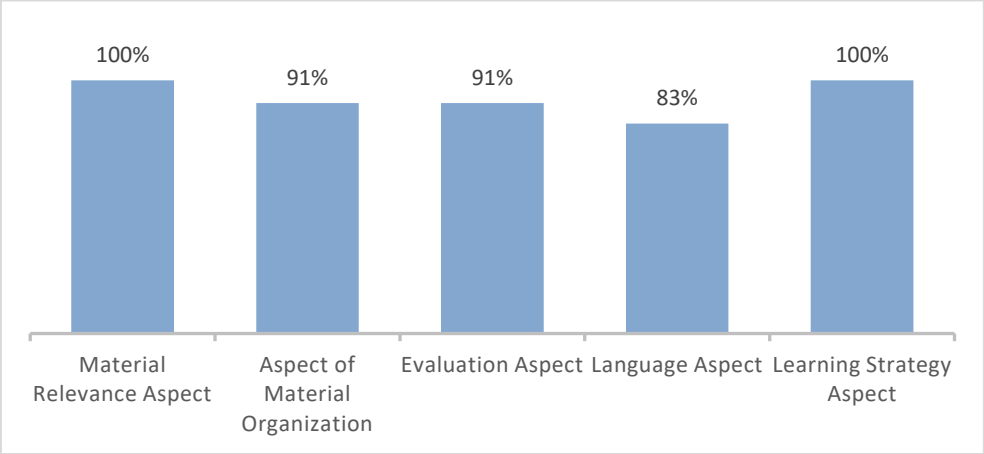
The prototype stage aimed to realize the KOMIK ALAM media product based on the previously designed storyboard and user requirements. All visual elements, including mockups, were created using Canva and integrated into a Google Sites platform. The integration includes four components: e-comic, video, LKPD (student worksheet), and an interactive quiz. The media interface is illustrated in Picture 7, which shows the front-end layout of KOMIK ALAM with menus tailored to the learning process.

Picture 7. KOMIK ALAM Interface

Picture 7. illustrates the structure of the website-based e-comic, which comprises five main menus: Home, Learning Outcomes, Comics, Activities, and References. These menus are designed to be user-friendly, enabling students to access materials easily and repeatedly via web browsers. The Comics menu includes two submenus: a series of five Heyzine Flipbook-based e-comics and a set of learning videos. The Activities menu offers a Liveworksheet-based LKPD and a Genially-supported interactive quiz to reinforce understanding and evaluate learning progress.

This combination of components reflects Edgar Dale's Cone of Experience theory, which emphasizes that learners retain more information when they are engaged in visual, auditory, and hands-on experiences (Zhang et al., 2023); Lohre et al., 2021). By integrating comics, videos, and activities within a single accessible platform, KOMIK ALAM provides a richer and more engaging learning experience that aligns with various levels of sensory involvement, thereby optimizing students' understanding and retention of the material.

To ensure the product's quality and feasibility, the researchers adopted and adapted a validation instrument from (Alfania et al., 2024). This previous research instrument was addressed to material and media experts and already had a rational product feasibility level of more than 60% before the readability test was carried out among students. The material validation results are shown in Picture 8, where expert assessments achieved a score of 93%, categorizing the media as "very feasible." This validates the effectiveness of the material content and its alignment with learning objectives.



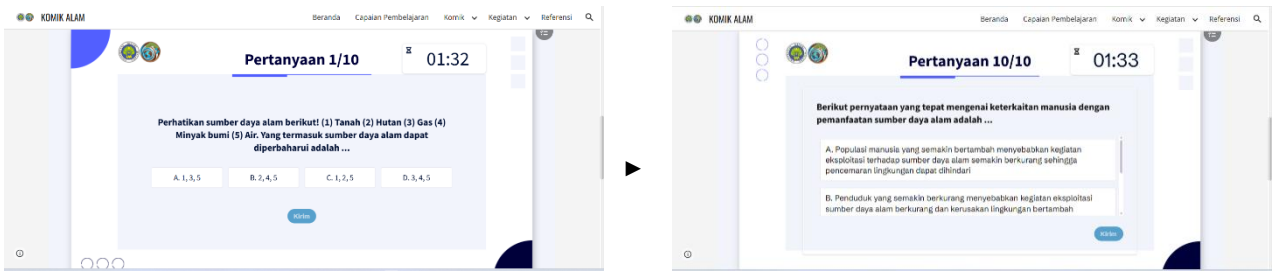
Picture 8. Material Validator Validation Results

This Picture 8. presents the percentage of media feasibility based on five assessed aspects. Experts acknowledged that the media content was well-structured and contextual. However, suggestions for improvement were made, such as increasing the number of HOTS-based questions. These suggestions are summarized in Table 4.

Table 4. Criticisms and Suggestions from Material Validators

No	Comments and Suggestions
1	Add more HOTS (High Order Thinking Skills) questions that reflect summative assessments.

To address this suggestion, a revision was made by integrating HOTS-based questions into the KOMIK ALAM quiz component. These questions are designed to stimulate higher-level thinking and better reflect the cognitive demands of summative assessments. The implementation of this improvement is illustrated in Picture 9.



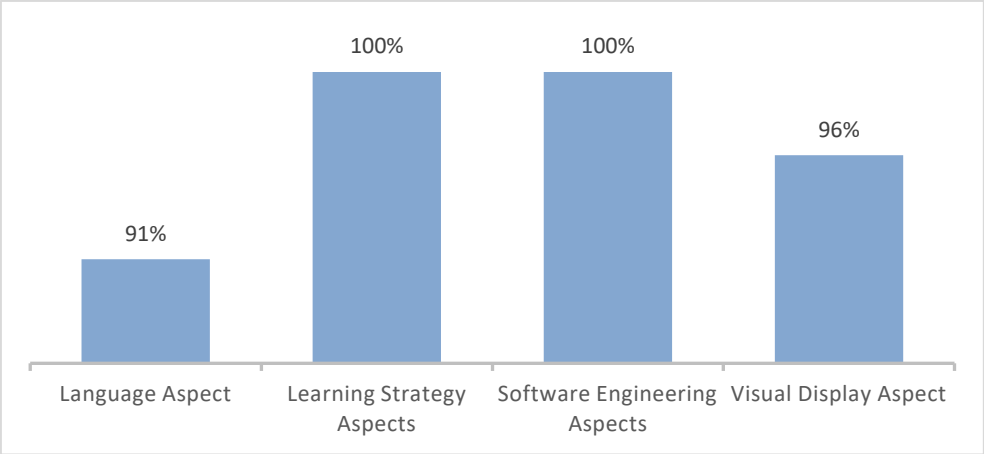
Before Revision | After Revision

Description: Adds HOTS (High Order Thinking Skills) questions to the quiz component, aligning with summative assessments and promoting analytical thinking.

Picture 9. Revision of KOMIK ALAM Product from Material Validator

After addressing the material validator's suggestions, particularly the addition of HOTS-based questions, development continued to the media validation stage. This stage aimed to evaluate the design quality, interactivity, and overall visual appeal of the KOMIK ALAM product. As shown in

Picture 10, the product achieved a validation score of 97.5%, categorizing it as "very feasible" for implementation in classroom learning. Media validators praised the engaging visuals and interactivity of the product, while also recommending improvements to the storytelling elements of the e-comic to enhance learner engagement further.



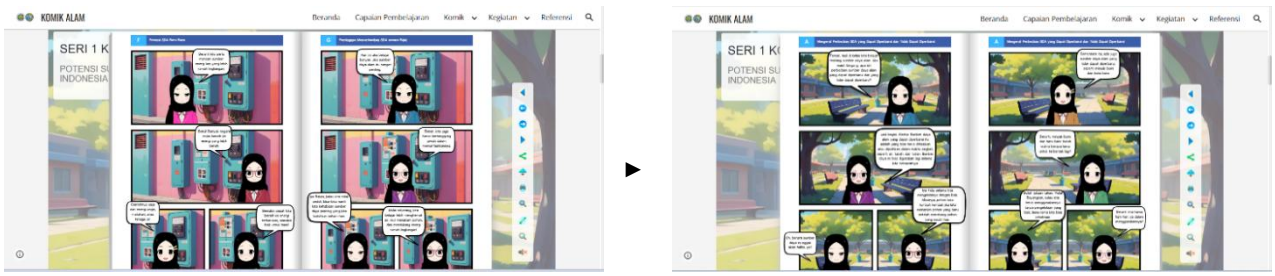
Picture 10. Media Validator Validation Results

This Picture 10. displays the media validator scores across four key aspects: interface design, navigation, presentation, and interactivity. Based on the feedback, the comic content was improved by embedding narrative-driven problems in each series to align better with the concept of illustrated storytelling.

Table 5. Criticisms and Suggestions from Media Validators

No	Comments and Suggestions
1	Enhance comic content with problems or storylines rather than just explanations.

The impact of these revisions is evident in Picture 11, which displays the before-and-after interface of the updated comic series. The revision ensures that the comics now embed contextual problems, enabling learners to apply analytical thinking and relate the content to real-life situations.



Before Revision | After Revision

Description: Adds comic content in each series by presenting a problem

Picture 11. Revision of KOMIK ALAM Product from Media Validator

Picture 11. compares the original and revised versions of the comic content, highlighting the integration of contextual problem narratives. Subsequently, a readability test was conducted with Grade VIII H students at MTs Negeri 2 Malang City, who served as potential users. The goal was to obtain feedback on media clarity, accessibility, and engagement. The results of this test are presented in Table 6, yielding a total score of 91.5%, which places it in the "very feasible" category.

Table 6. Learner Readability Test Results

No	Aspects	Score
1	Language	326
2	*Website Components*	327
3	Display Organization	431
4	Presentation of Material	672
5	Overall	440
	Total Score	2.196
	Percentage	91,5%
	Eligibility Criteria	Very Feasible

This confirms that the media is well-received by users and supports effective learning. Students expressed enthusiasm and found the media more contextual and practical compared to traditional methods. Their comments are presented in Table 7.

Table 7. Criticism and Suggestions from Learners

No	Comments and Suggestions
1	Add more comic series and include background music to enhance engagement.

These suggestions are valuable for iterative improvement of the product, ensuring that future versions can further enhance user engagement. According to Dale's cone theory, the closer the media resembles real experiences through audio-visual interaction, the better the learner's retention and understanding. Therefore, KOMIK ALAM stands out by integrating these immersive elements in a structured, student-centered digital environment, unlike previous studies that focused solely on passive, non-interactive e-comic formats. The final version of the KOMIK ALAM product is accessible via the following link: bit.ly/komikalam.

3.2 Discussion

The KOMIK ALAM (E-Comic Utilization of Natural Resources) learning media is highly feasible for use in Junior High School social studies learning. Its effectiveness stems from its use of visual illustrations and narrative structures that reflect real-life contexts, helping students better grasp complex subject matter. This supports previous findings that e-comics enhance student comprehension and encourage the application of learning in everyday life (Malik & Ginanjar, 2023). In this media, the core material is presented through character-driven storylines focusing on the potential of forests, mining, and maritime resources, and their responsible use.

The development of KOMIK ALAM is closely aligned with Edgar Dale's Cone of Experience, which suggests that the depth of learning is influenced by the degree of sensory involvement and learner participation. More concrete and experiential learning activities tend to result in better retention and understanding (Coleman et al., 2020; Chan & Chan, 2023; Munir et al., 2024). KOMIK ALAM applies this theory by combining multiple levels of sensory engagement. At the more abstract level of Dale's model, verbal symbols are represented through written texts and comic dialogues. These offer a more engaging alternative to conventional textbooks and help stimulate students' interest in reading and understanding content (Haleem et al., 2022).

Moving toward more concrete experiences, learners benefit from visual and auditory inputs. KOMIK ALAM includes video materials that offer visual representations of natural resource utilization, supporting deeper conceptual understanding through audio-visual learning (Wahyuningtyas et al., 2021; Rzyankina et al., 2024). This component bridges abstract textual knowledge with dynamic visual experiences. Additionally, students learn effectively by observing illustrations and diagrams. The e-comic format supports this by providing engaging, story-based visuals that depict concrete scenarios related to environmental preservation and resource use (Canuto et al., 2024).

KOMIK ALAM also facilitates student interaction through activities such as LKPD and quizzes. These components promote active learning, allowing for immediate practice and feedback. Engaging students in interactive tasks aligns with higher levels of Dale's cone, where learners move from passive reception to active construction of knowledge (Albay & Eisma, 2021; Karanjakwut & Sripicharn, 2023). This experience helps students not only absorb information but also apply it through problem-solving tasks.

Although the most concrete level of Dale's model, direct experience, is not fully replicated, KOMIK ALAM compensates by providing simulations of real-world conditions through digital comics and media. This is especially valuable in addressing logistical challenges that prevent direct observation or field visits (Aalders et al., 2020; Lo et al., 2022). As such, KOMIK ALAM offers a practical alternative for delivering meaningful, experience-based learning in contexts where direct exposure is limited.

From a theoretical and practical perspective, the novelty of this research lies in its comprehensive implementation of Dale's cone across a fully integrated, website-based learning platform. Unlike previous studies that developed static or single-format e-comic media, KOMIK ALAM introduces a multimodal solution that merges e-comics, videos, interactive exercises, and assessments. It not only supports diverse learning styles, visual, auditory, and kinesthetic, but also addresses the cognitive demands of social studies topics such as natural resource utilization. This structured and immersive learning design fills a critical gap in educational media development, demonstrating how digital tools can enhance student engagement and understanding in abstract subject matter.

Feedback from both experts and student users further validates the relevance and effectiveness of the media. Students appreciated its contextual, interactive, and visual presentation, which helped them engage more meaningfully with the topic. Some suggestions for improvement, such as adding musical elements, highlight areas for potential future development, although technical limitations

currently restrict such additions. Nonetheless, the core design and structure of KOMIK ALAM have shown strong potential to enhance the learning experience in social studies education.

4. Conclusion

The development of KOMIK ALAM (E-Comic Utilization of Natural Resources) followed the four stages of the Design Thinking model, resulting in a website-based learning media that integrates e-comics, instructional videos, LKPD, and interactive quizzes. Designed to support the topic "Utilization of Natural Resources" in Junior High School social studies, the media presents contextual content and real-world problems that encourage critical thinking. Validation by subject matter and media experts, along with readability tests by 30 Grade VIII students at MTs Negeri 2 Malang City, confirmed that KOMIK ALAM is highly feasible for classroom use. The findings demonstrate how web-based, multimodal learning tools grounded in Edgar Dale's Cone of Experience can support students' diverse learning styles, enhance their engagement, and improve comprehension of complex environmental concepts.

Despite its strengths, this study has limitations. It was conducted in a single school without experimental testing to measure learning effectiveness. Therefore, further research is recommended to evaluate the impact of KOMIK ALAM through classroom experiments or quasi-experimental designs involving larger and more diverse student groups. Future studies may also explore the scalability of this media across different regions and contexts. With continued development, KOMIK ALAM has strong potential as an innovative and contextually rich educational tool that supports environmental literacy and national curriculum objectives in social studies learning.

5. References

Aalders, J. T., Moraa, A., Oluoch-Olunya, N. A., & Muli, D. (2020). Drawing Together: Making Marginal Futures Visible through Collaborative Comic Creation (CCC). *Geographica Helvetica*, *75*(4), 415–430. https://doi.org/10.5194/gh-75-415-2020.

Albay, E. M., & Eisma, D. V. (2021). Performance Task Assessment Supported by the Design Thinking Process: Results from a True Experimental Research. *Social Sciences and Humanities Open*, *3*(1), 100116. https://doi.org/10.1016/j.ssaho.2021.100116.

Alfania, S., Wahyuningtyas, N., & Prasat, R. R. (2024). Development of Mobile Learning NARACY (Financial Literacy) as a Learning Media for Social Studies Subjects in Junior High School. *International Journal of Social Learning (IJSL), 4*(3), 311–331. https://doi.org/10.47134/ijsl.v4i3.279.

Apostolou, D., & Linardatos, G. (2023). Cognitive Load Approach to Digital Comics Creation: A Student-Centered Learning Case. *Applied Sciences, 13*(13), 7896. https://doi.org/10.3390/app13137896.

Canuto, P. P., Pagdawan, R., Choycawen, M., Lumecio, D., & Dupais, N. (2024). Pre-Service Teachers' Experiences in Developing and Using Science Comics as Educational Materials for Elementary Science Education. *Pakistan Journal of Life and Social Sciences, 22*(2), 7165–7187. https://doi.org/10.57239/PJLSS-2024-22.2.00542.

Capone, R., & Lepore, M. (2022). From Distance Learning to Integrated Digital Learning: A Fuzzy

Cognitive Analysis Focused on Engagement, Motivation, and Participation During COVID-19 Pandemic. *Technology, Knowledge and Learning, 27*(4), 1259–1289. https://doi.org/10.1007/s10758-021-09571-w.

Chan, J. W. Y., & Chan, W. W. L. (2023). Examining the Learning Effects of Concrete and Abstract Materials Among University Students Using a Two-Dimensional Approach. *British Journal of Educational Psychology, 93*(4), 1053–1071. https://doi.org/10.1111/bjep.12619.

Coleman, B. M., Bunch, J. C., Thoron, A. C., & Roberts, T. G. (2020). Examining the Effects of Reflection Type and Abstraction Order on Content Knowledge and Content Knowledge Retention During Experiential Learning. *Journal of Agricultural Education, 61*(3), 308–320. https://doi.org/10.5032/jae.2020.03308.

Dam, R. F. (2025, *January 10). The 5 Stages in the Design Thinking Process. Interaction Design Foundation*. Retrieved from https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process.

Endres, T., Lovell, O., Morkunas, D., Rieß, W., & Renkl, A. (2023). Can Prior Knowledge Increase Task Complexity? – Cases in Which Higher Prior Knowledge Leads to Higher Intrinsic Cognitive Load. *British Journal of Educational Psychology, 93*(2), 305–317. https://doi.org/10.1111/bjep.12563.

Fabillar, R., Ummas, J., Pateyec, J., Domingo, M. G., Canuto, P. P., Choycawen, M., … Lumidao, Y. (2024). Science Comics as Educational Materials and its Impact on Elementary Students' Science Academic Performance. *Pakistan Journal of Life and Social Sciences, 22*(1), 6176–6188. https://doi.org/10.57239/PJLSS-2024-22.1.00456.

Fajri, C., & Sutrisno. (2020). Perancangan Shelter Bus Mebidang dengan Menggunakan Quality Function Deployment (QFD). *Jurnal Sistem Teknik Industri, 22*(1), 77–89. https://doi.org/10.32734/jsti.v22i1.3630.

Fitria, Y., Malik, A., Mutiaramses, Halili, S. H., & Amelia, R. (2023). Digital Comic Teaching Materials: It's Role to Enhance Student's Literacy on Organism Characteristic Topic. *Eurasia Journal of Mathematics, Science and Technology Education, 19*(10), 2333. https://doi.org/10.29333/ejmste/13573.

Gastar, J. M. E., & Linaugo, J. D. (2022). Acquisition of Science Process Skills through Alternative Learning Modalities among Senior Secondary School Students. *Philippine Social Science Journal, 5*(1), 71–79. https://doi.org/10.52006/main.v5i1.461.

Haleem, A., Javaid, M., Qadri, M. A., & Suman, R. (2022). Understanding The Role of Digital Technologies in Education: A Review. *Sustainable Operations and Computers, 3*, 275–285. https://doi.org/10.1016/j.susoc.2022.05.004.

Handoyo, B., Soekamto, H., Putra, A. K., Kamil, P. A., & Wulandari, F. (2024). Disaster Preparedness: The Role of Spatial Disaster Learning Using Geospatial Technology. *Jàmbá: Journal of Disaster Risk Studies, 16*(1), 1576. https://doi.org/10.4102/jamba.v16i1.1576.

Indriani, F. F., & Sakti, N. C. (2022). Pengembangan e-LKPD Berbasis Komik untuk Meningkatkan Kemampuan Berpikir Kritis Peserta Didik Kelas XI IPS SMA. *Jurnal PTK Dan Pendidikan, 8*(1), 65–77. https://doi.org/10.18592/ptk.v8i1.6414.

Johansen, K. (2023). Challenges Regarding Digital Distance Learning of Operationally- Oriented Professions, Due to COVID-19 Pandemic. *International Journal of Educational Research Open,*

4, 100225. https://doi.org/10.1016/j.ijedro.2023.100225.

Karanjakwut, C., & Sripicharn, P. (2023). Effects of Video-Enhanced Language Teaching on the Thai EFL Teachers' Low VBI Competency. *International Journal of Education and Literacy Studies, 11*(3), 46–60. https://doi.org/10.7575/aiac.ijels.v.11n.3p.46.

Kurniawan, B., Shrestha, R. P., bin Haji Mat Lazim, M. J., Abd Hamid, A. bin, Hariyono, Sulistyo, W. D., … Wahyuni, F. (2023). Si-VirPraJa: Using an Immersive Technology to Learn Prehistoric Sites in Indonesia. *International Journal of Interactive Mobile Technologies, 17*(23), 140–152. https://doi.org/10.3991/IJIM.V17I23.45941.

Li, T., Wang, W., Li, Z., Wang, H., & Liu, X. (2022). Problem-Based or Lecture-Based Learning, Old Topic in the New Field: A Meta-Analysis on the Effects of PBL Teaching Method in Chinese Standardized Residency Training. *BMC Medical Education, 22*(1), 221. https://doi.org/10.1186/s12909-022-03254-5.

Lo, P., Lyu, Y. P., Chen, J. C. chen, Lu, J. L., & Stark, A. J. (2022). Measuring the Educational Value of Comic Books from the School Librarians' Perspective: A Region-Wide Quantitative Study in Taiwan. *Journal of Librarianship and Information Science, 54*(1), 16–33. https://doi.org/10.1177/0961000620983430.

Lohre, R., Warner, J. J., Morrey, B. R., Athwal, G. S., Morrey, M. E., Mazzocca, A. D., & Goel, D. P. (2021). Mitigating Surgical Skill Decay in Orthopaedics Using Virtual Simulation Learning. *JAAOS: Global Research and Reviews, 5*(10), 1–15. https://doi.org/10.5435/JAAOSGlobal-D-21-00193.

Malik, A. A., & Ginanjar, A. (2023). Pengembangan E-comic sebagai Media Pembelajaran IPS pada Materi Organisasi Pergerakan Nasional Indonesia di MTs Negeri 1 Kota Bekasi. *Sosiolium: Jurnal Pembelajaran IPS, 5*(1), 34–40. https://doi.org/10.15294/sosiolium.v5i1.58139.

Mamolo, L. A. (2022). Students' Evaluation and Learning Experience on the Utilization of Digital Interactive Math Comics (DIMaC) Mobile App. *Advances in Mobile Learning Educational Research, 2*(2), 375–388. https://doi.org/10.25082/AMLER.2022.02.006.

Marougkas, A., Troussas, C., Krouska, A., & Sgouropoulou, C. (2023). Virtual Reality in Education: A Review of Learning Theories, Approaches and Methodologies for the Last Decade. *Electronics, 12*(13), 2832. https://doi.org/10.3390/electronics12132832.

Meda, L., & Waghid, Z. (2022). Exploring Special Need Students' Perceptions of Remote Learning Using the Multimodal Model of Online Education. *Education and Information Technologies, 27*(6), 8111–8128. https://doi.org/10.1007/s10639-022-10962-4.

Munir, S., Rahmayanti, D. A., Farhana, N., Suwanan, A. F., Adi, K. R., & Sa'id, M. (2024). Managing Critical Thinking Skills to Resilience Profile of Pancasila Students in Indonesia Using Controversial Public Issues Model. *Revista de Gestão Social e Ambiental*, *18*(5), 1–15. https://doi.org/10.24857/rgsa.v18n5-025.

Muslihati, M., Sobri, A. Y., Praherdhiono, H., Dewangga, T., Nurdiana, T., & Riski, R. (2018). *Manajemen Inovasi: Pengembangan Kemampuan Adaptabilitas terhadap Era Disrupsi*. Malang: Bentara Pustaka.

Palmieri, S., Bisson, M., & Ianniello, A. (2020). Environmental Design Multisensory Experience. Integrated Space for Simulation Activities. *AGATHÓN | International Journal of Architecture, Art and Design, 7*, 202–209. https://doi.org/10.19229/2464-9309/7212020.

Pan, C. T., & Hsu, S. J. (2020). Effects of a One-Day Environmental Education Program on Sixth-Graders' Environmental Literacy at a Nature Center in Eastern Taiwan. *Sustainability, 12*(12), 5043. https://doi.org/10.3390/su12125043.

Perez, M. M. (2022). Second or Foreign Language Learning Through Watching Audio-Visual Input and the Role of On-Screen Text. *Language Teaching, 55*(2), 163–192. https://doi.org/10.1017/S0261444821000501.

Perguna, L. A., Idris, & Irawan. (2020). From Content to Context: Understanding Introduction to Sociology through MOOC. *International Journal of Emerging Technologies in Learning (IJET), 15*(07), 188–195. https://doi.org/10.3991/ijet.v15i07.13467.

Philippe, S., Souchet, A. D., Lameras, P., Petridis, P., Caporal, J., Coldeboeuf, G., & Duzan, H. (2020). Multimodal Teaching, Learning and Training in Virtual Reality: A Review and Case Study. *Virtual Reality and Intelligent Hardware, 2*(5), 421–442. https://doi.org/10.1016/j.vrih.2020.07.008.

Purnomo, A., Kurniawan, B., & Adi, K. R. (2020). Expanding Learning Environment Through Mobile Learning. *International Journal of Emerging Technologies in Learning (IJET), 15*(07), 123–131. https://doi.org/10.3991/ijet.v15i07.13215.

Rahmah, H. R. F., Wahyuningtyas, N., Ratnawati, N., Marsida, R., Mufid, M. K. A. W., & Ibrahim, M. H. (2022). Development of "ARCIL" Media in Prehistoric Culture Materials for Junior High School Students. *International Journal of Interactive Mobile Technologies (IJIM), 16*(22), 176–190. https://doi.org/10.3991/ijim.v16i22.36155.

Rifdarmon, Ganefri, Lapisa, R., Giatman, M., Jalinus, N., & Maksum, H. (2024). Integration of Mobile Learning in Rifdarmon Model to Improve Student Learning Outcomes. *International Journal of Interactive Mobile Technologies (IJIM), 18*(23), 98–109. https://doi.org/10.3991/ijim.v18i23.51217.

Rzyankina, E., George, F., & Simpson, Z. (2024). Enhancing Conceptual Understanding in Engineering Mathematics Through E-Textbooks. *IEEE Transactions on Education, 67*(4), 534–541. https://doi.org/10.1109/TE.2024.3387102.

Saputri, D. Y., Indriayu, M., & Rukayah. (2024). Learning Transformation 4.0 with Games-Based Interactive Multimedia: Its Effectiveness Towards Elementary School Students' Cognitive Skills. *Pegem Journal of Education and Instruction, 14*(4), 381–392. https://doi.org/10.47750/pegegog.14.04.36.

Siregar, D. T., Bunari, B., Asril, A., Ahmal, A., & Antosa, Z. (2024). Pengembangan Media Komik Digital pada Materi Proklamasi Kemerdekaan Indonesia Sebagai Sumber Belajar Siswa Kelas XI IPS. *JAMPARING: Jurnal Akuntansi Manajemen Pariwisata Dan Pembelajaran Konseling, 2*(1), 63–73. https://doi.org/10.57235/jamparing.v2i1.1789.

Sugiyono. (2020). *Metode Penelitian Kuantitatif dan Kualitatif Serta R&D*. Yogyakarta: Alfabeta.

Suharsimi, A. (2020). *Prosedur Penelitian: Suatu Pendekatan Praktik (Edisi Revisi)*. Jakarta: Rineka Cipta.

Wahyuningtyas, N., & Idris. (2020). Increasing Geographic Literacy through the Development of Computer Supported Collaborative Learning. *International Journal of Emerging Technologies in Learning (IJET), 15*(07), 74–85. https://doi.org/10.3991/ijet.v15i07.13255.

Wahyuningtyas, N., Ruja, I. N., Yahya, M. H., Wijaya, D. N., & Ibrahim, M. H. (2021). Developing of a Learning Media for Smartphones for Disaster Mitigation Education. *International Journal of Emerging Technologies in Learning (IJET), 16*(07), 160–174. https://doi.org/10.3991/ijet.v16i07.21195.

Zhang, Y., Xu, D., Wang, T., Yang, K., Yao, X., Cheng, M., & Ge, D. (2023). The Intercultural Communication Competence Improvement for Pre-Service CSL Teachers: A Blended Learning Method Based on SVVR. *Human Systems Management, 43*(5), 789–804. https://doi.org/10.3233/HSM-230060.

Zuo, R., Talib, O., Nasuha, N. A., Burhanuddin, Li, W., & Liu, X. (2023). An Empirical Study of Virtual Reality–Based Learning Approaches to Promote Motivation and Mathematical Achievement in Mathematics. *The International Journal of Science, Mathematics and Technology Learning, 31*(1), 37–53. https://doi.org/10.18848/2327-7971/CGP/v31i01/37-53.