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Integrating Comic into Biology Education Handout: Enhancing Reproductive Health Learning at SMA 1 Cawang Baru

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ABSTRACT

Reproductive health education is often challenging and unengaging, particularly for adolescents undergoing puberty. The lack of interactive and entertaining teaching materials further hinders effective learning. This study aims to develop and evaluate a Comic-integrated handout on reproductive health for students at SMA 1 Cawang Baru. In this study, the research and development (R&D) approach was employed following Sugiyono's development model. The Comic-integrated handout combines material content, Comic-based entertainment, educational video links, and online tests. Validation results indicated feasibility scores of 75% (linguist), 78.33% (material expert), and 86.61% (media expert). Students' comprehension in the high category increased from 5.13% to 69.23%, while the low category decreased from 84.61% to 12.82%. Test scores improved from 44.62 to 81.03, with an overall perception score of 84.55% categorized as "Strongly Positive". These findings indicate that the Comic-integrated handout is a potential and promising educational tool that improves student engagement and understanding. Therefore, we suggest this approach could be applied in future studies that focus on refining contextual relevance and expanding the approach's implementation across various educational settings.

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INTRODUCTION

Human reproductive health is one of the materials that Class XI high school students must master. Human reproductive health is a biological concept that requires a

high level of understanding and is very close to everyday life (Mahardika & Rachman, 2023). Research by Azis *et al.* (2022) said that most of the adolescent reproductive health knowledge was in the poor category.

Students, especially adolescents, need to understand the human reproductive system because it is important for life and is one of the learning materials that must be mastered. Unfortunately, students' knowledge of reproductive health in Indonesia is still relatively low (Azis & Pratiwi, 2019). Previous research revealed that 73.46% of adolescent boys and 75.6% of adolescent girls aged 15-19 years in Indonesia did not adequately understand human reproductive health (Aryani *et al.*, 2022). Based on interviews with students at SMA 1 Cawang, the low knowledge is due to reproductive health material being considered difficult.

Teaching materials and learning media are some factors that cause students difficulties in learning human reproductive health material (Mahardika & Rachman, 2023). One teaching material that is easy to use is handouts. Handouts can be used as a learning resource containing a summary of material that helps students to learn independently (Nugroho, 2011). Previous research has developed handouts, namely, e-handouts of Digestive System material (Handani, 2024), biology handouts on Biodiversity material (Rozalia, 2018), and contextual-based handouts in biology lessons on biotechnology material (Rahmayani *et al.*, 2015). The handouts developed did not contain entertainment elements to attract students' interest in

reading. The entertainment content can be implemented in the form of comics.

Comics are visual media that are popular with the public, especially teenagers. Teachers can utilize the advantages of comics as one of the learning media to help achieve learning goals (Koekoeh, 2021). Comics can be one of the strategies in learning that serves to convey messages (Minarti, 2023). Comics are one of the learning media that help the student learning process. Learning media is needed in student self-development both cognitively, affectively, and psychomotorically (Napitupulu *et al.*, 2023). In previous research, no one has tried to combine handouts with comics as teaching materials on reproductive health materials.

We need to develop comic-integrated handouts to overcome students' low knowledge related to reproductive health and the absence of teaching materials that incorporate entertainment. Therefore, this article aims to develop comic-integrated handouts on reproductive health material at SMA 1 Cawang Baru. In addition, this article aims to determine student perceptions of the comic-integrated handouts made. Handouts can contain writing containing important points of material that contains interesting images, videos, and animations (Handani, 2024). Comics can help students develop language skills, be creative in storytelling and writing, and help them

remember the material's content (Isma, 2008). The urgency of learning biology aided by comic-integrated handouts on human reproductive health material is to attract students' interest in learning human reproductive health material. The digital comic integrated handout is also expected to increase understanding of human health so adolescents know the importance of human reproductive organs.

RESEARCH METHODS

Methods

The method is developed using research and development steps from a book by Sugiyono (2019). The book explains the development steps, including potential problems, data collection, product design, design validation, design revision, product trial tests, product revision, usage trials, product revision, and mass production. This study's research stage only reached product revision before the usage trial. Due to time constraints, further research is needed at school.

Location and Time of Research

This research was conducted at SMA 1 Cawang Baru, Jakarta. The school is at Jalan Cawang Baru, No.7, RT.7/RW.10, Cipinang Cempedak, Jatinegara District, East Jakarta City, Special Capital Region of Jakarta. The research was conducted from July to December 2024.

Data Collection and Analysis Techniques

Characteristics of Comic-integrated Handout

Identification of Potential and Problems. Identifying potentials and problems was carried out through test and interview techniques. The test was conducted on students using multiple choice 20 items related to reproductive health knowledge. Interviews were conducted with Biology teachers to find out the obstacles to learning. Data were analyzed with descriptive statistics by calculating the mean and categorizing it into high, medium, and low categories.

Data Collection. Data collection was conducted to create human reproductive health content. Data was collected by literature study from articles on Google search, books, and videos. The data were analyzed qualitatively by reducing the information from the literature and describing the summary used in the content.

Product Design. Comic-integrated handouts were developed at the product design stage using Canva and Heyzine applications. The data were analyzed qualitatively by describing the characteristics of the comic integrated handout.

Feasibility Test or Design Validation

Comic-integrated handouts were validated by expert validators, namely material experts, media experts, and

linguists, to assess the feasibility of content, appearance, and language use in learning media. Data were analyzed descriptively statistically by calculating the Average and categorizing in the categories of Very Feasible ($81.25 < \text{score} < 100$); Feasible ($62.50 < \text{score} \leq 81.25$); Less Feasible ($43.75 < \text{score} \leq 62.50$); and Not Feasible ($25.00 < \text{score} \leq 43.75$) (Sutama et al., 2020). Revisions were made from validator input to improve product quality before testing with students.

Product Trial Test

Summative testing. This trial used pre-experimental designs with a one-group pretest-posttest design on 39 class XI students. Students were asked to take an initial test before learning. Furthermore, students were given learning on reproductive health using comic-integrated handouts. Students were asked to take a final test at the end of the lesson. The test consisted of 10 multiple-choice questions. Data were analyzed with descriptive statistics, namely calculating the mean and the difference in scores between pre and post-tests. The data results were categorized into five levels, namely Excellent (90-100), Above Average (80-89), Average (70-79), Below Average (60-69), and Failure (0-59) (Briggs et al., 2023).

Formative testing. This trial was conducted by learning using comic-integrated handouts with the same class. At

the end of the lesson, students were given a questionnaire totaling 20 statement items to determine students' perceptions of the comic-integrated handout. Descriptive statistics analyze data by categorizing it into categories. The data results are categorized, namely Strongly positive (84-100), Positive (68-83), Moderate (52-67), Negative (36-51), and strongly negative (0-35) (Sakkir et al., 2020).

RESULTS AND DISCUSSION

Characteristics of Comic-integrated Handout

Development begins with identifying potential and problems. The test contained 20 multiple-choice questions given to 39 grade XI students at SMA 1 Cawang Baru. The questions consisted of 10 items covering indicators such as reproductive anatomy, physical changes during puberty, and prevention of sexually transmitted diseases. The results show that the average score of reproductive knowledge is not optimal, which is 44.62, which is in the low criteria, with 84.61% of students. Based on interviews with biology teachers, teaching materials integrated with innovative learning media are needed to improve students' understanding of human reproductive health material. Efforts made at this stage were to formulate ideas related to developing comic-integrated handouts.

The material content used in developing handouts comes from scientific articles, books, and the web related to the reproductive system. The comic integrated handout consists of five parts: the cover page, home page, comic, material 1 about the male reproductive system, material 2 about the female reproductive system, material 3 about reproductive system diseases, and the closing page. In making

digital comic-integrated handouts on human reproductive health at SMA 1 Cawang Baru, researchers use the role of technology, namely the Canva and Heyzine applications used to design, compile, and publish comics. This product is presented at the link: <https://heyzine.com/flip-book/0c1e9e7b9a.html>. The comic-integrated handout display is presented in **Figure 1**.

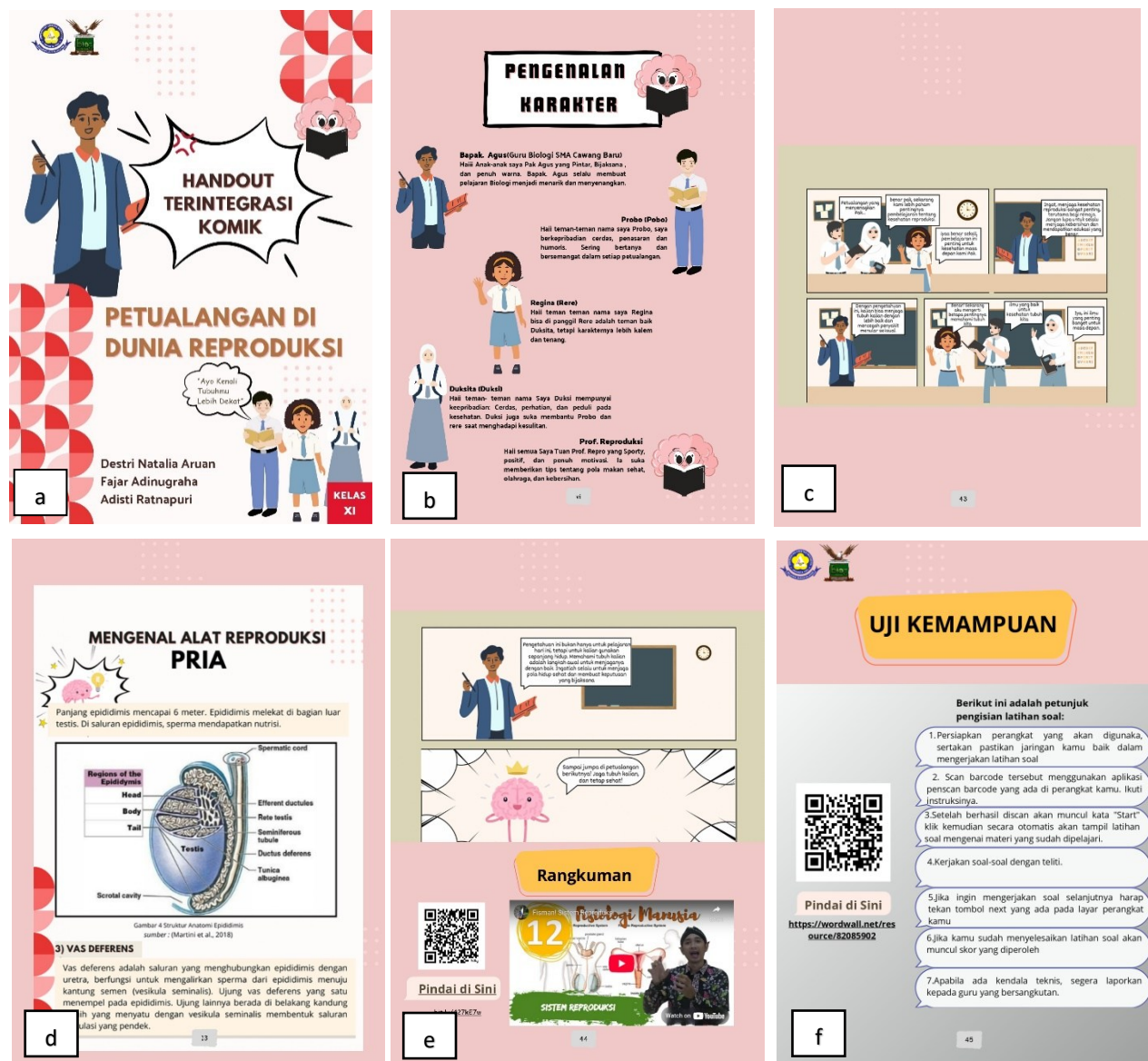


Figure 1. Comic integrated handout on Reproductive System Material. (a) Cover Page; (b) Home Page; (c) Comic; (d) Material; (e) Video Link; (f) Competency Ability Test

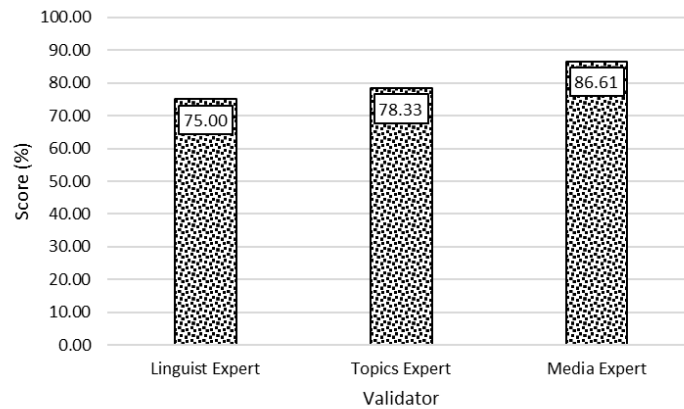


Figure 2. Feasibility Test or Validation of Comic Integrated Handout

Comic-integrated handouts have characteristics, namely containing material content, entertainment in the form of comics, digital content such as educational video links, and online competency tests. The characters in the comics display pluralism or multiculturalism by presenting characters that represent tribes in Indonesia. Educational videos also provide an alternative to on-site learning in situations where it may not be possible to do so (Adinugraha, 2022). This comic-integrated handout is expected to be an alternative to learning reproductive health topics.

Feasibility Test of Comic-integrated Handout

Comic-integrated handouts were feasibility tested with assessment and input from expert validators in topic, language, and media. Before content validation by assessment, validation is also carried out in the form of discussion so that revisions are made after review by the validator (Napitupulu et al., 2023). The presentation

must also be made more attractive and easy to read so that students can achieve their learning objectives (Novalina et al., 2023). The validation results are presented in **Figure 2.**

Three experts carried out the validation results in Figure 2 and obtained a score of 75.00% (feasible) from linguists, 78.33% (feasible) from material experts, and 86.61% (very feasible) from media experts. Based on the average calculation, the handout obtained an overall score of 79.98%, which is included in the Worthy category according to the criteria set by Sutarna et al. (2020). Although it has not reached the Very Eligible category, this result shows that the handout has met the eligibility standards and can be used properly. Improvements in language and material aspects can further optimize the quality of the handout.

In the linguistic aspect, a score of 75.00% indicates that the handout has met

the feasibility criteria. The use of language in the handout is considered quite good in terms of clarity (straightforward), ability to convey information communicatively, dialogical and interactive approach, suitability for learner development, and compliance with language rules. Although feasible, improvements in vocabulary selection, the arrangement of more interesting sentences, or simplifying technical terms can help improve the handouts.

Regarding the material aspect, the average score of 78.33% is also in the appropriate category. This data shows that the handout has sufficient content to meet the learning objectives (content feasibility), a clear and coherent delivery method (delivery feasibility), and concepts that support students' understanding (conceptual assessment). Although the content feasibility indicator has entered the Highly Appropriate category, the delivery and conceptual assessment aspects are still in the Appropriate category, so they can be improved by adding more relevant examples, supporting illustrations, or more in-depth concept explanations.

Meanwhile, in the media aspect, the score of 86.61% places it in the Very Appropriate category. This high score indicates that the graphical display (graphical aspect) and the way the material

is presented are considered very good. Attractive visuals, a neat layout, and the use of colors and design elements that support understanding are the advantages of this aspect. After making revisions based on validator input, learning was carried out using comic-integrated handouts.

Product Trial Test

Summative Testing

After students learned using the comic-integrated handout, their abilities improved significantly, as shown by the reclassified pre-test and post-test results. In the High category (which combines Excellent and Above Average levels), the proportion of students increased sharply from 5.13% in the pre-test to 69.23% in the post-test. In the Sufficient category, there was an increase from 10.26% to 17.95%, indicating that some students who previously had low understanding managed to reach a fairly good level of understanding. Meanwhile, in the Low category (a combination of Below Average and Failure), there was a drastic decrease from 84.61% in the pre-test to only 12.82% in the post-test. This decrease shows that most students with low understanding managed to improve their abilities to a better level. These results indicate that learning using comic-integrated handouts can improve student understanding. The data is presented in **Figure 3.**

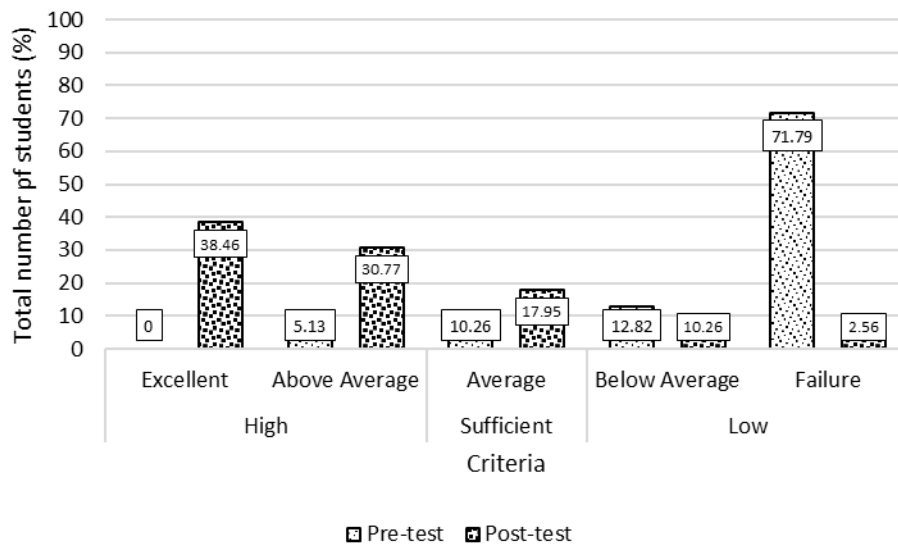


Figure 3. Student Categories Before and After Learning

There was an increase in scores between the pre-test and post-test results after the application of learning using comic-integrated handouts. The average pre-test score showed a score of 44.62, which reflects that students' initial understanding was in the low category. After learning, the average post-test score increased to 81.03, which is included in the high category according to the criteria of Briggs et al. (2023). This increase indicates that using comic-integrated handouts improved students' overall understanding. The considerable difference in improvement indicates that this teaching material is effective in helping students understand the material better. The data is presented in **Figure 4.**

Formative Testing

The comic-integrated handout assessment showed positive results in various aspects according to the assessment criteria by Sakkir et al. (2020). The Topic or Materials aspect obtained the highest score of 86.67%, which is included in the Strongly Positive category, indicating that the material presented is very relevant and in accordance with learning needs. The Display aspect scored 85.00%, which is also included in the Strongly Positive category, indicating that the handout display is attractive and easy to understand. The Attraction aspect, with a score of 83.08%, is in the Positive category, which indicates that the handout has a good attraction to motivate students. The Benefit aspect scored 83.46%, also in the Positive category. The data is presented in **Figure 5.**

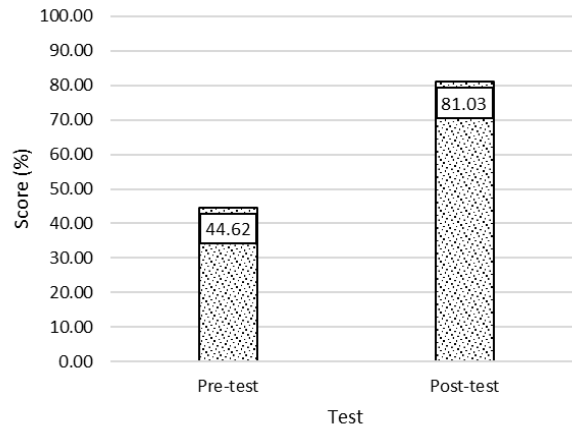


Figure 4. Students' scores before and after learning

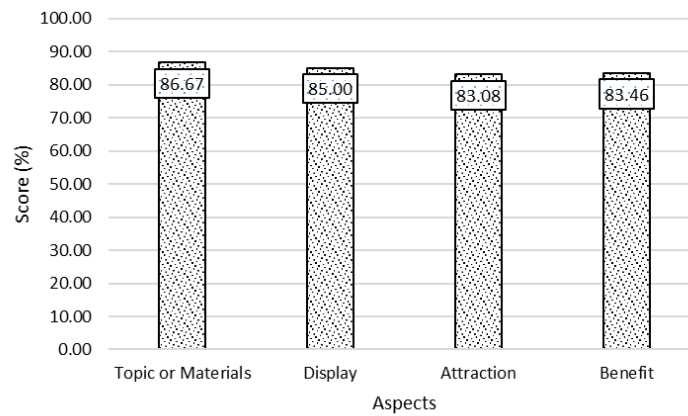


Figure 5. Students' Perception of Comic Integrated Handout

Overall, this comic-integrated handout obtained a total score of 84.55%, which falls into the Strongly Positive category. These results indicate that students rated the comic-integrated handout very positively in supporting the learning process, with prominent aspects of the material and excellent appearance. Students with a good view or response to teaching materials tend to be more motivated to read and understand the material (Adinugraha & Ratnapuri, 2020). Positive perceptions or responses to books can motivate students to remember

important things contained in the book (Adinugraha, 2018).

Biology learning, especially in reproductive health material, requires an approach that is interesting and easily understood by students (Asrowi et al., 2019). One innovative method that can be used is comic-integrated handouts. This method combines text and visual comic illustrations to make learning fun and effective. Handouts contain a summary of material that supports students' independent learning (Nugroho, 2011). One of the effective

learning media is comics, which functions to convey messages interestingly and help the learning process of students ((Minarti, 2023). This learning media plays an important role in students' cognitive, affective, and psychomotor development (Napitupulu *et al.*, 2023). The combination of handouts and comics has been proven to increase the value of students' knowledge about the reproductive system.

One of the positive impacts of using comic-integrated handouts is to increase the attractiveness of learning. Students often feel bored with long texts and abstract theories (Nawwar, 2021) in reproductive health materials. Comic media is a visual media that contains illustrations with a coherent and clear story that makes it easier for students to understand the contents of the media (Eva *et al.*, 2020). Comics can convey information that is easy to understand because they combine the power of images and writing assembled in a storyline that makes information easy to absorb (Haka & Suhanda, 2018). The illustrations provided on the handout also increase students' understanding. The illustrations need to be given text to make the story easier to understand (Susanto *et al.*, 2024). Therefore, teachers are expected to adopt this innovation to improve the quality of biology learning, especially in topics that require a visual and interactive approach.

The limitation of this study is that the comic integrated handout is still in the trial stage and has not yet been implemented. In the future, this teaching material needs to be implemented and tested for effectiveness on a wide scale. Topics related to reproductive health can also be contextualized with topics tailored to facts or phenomena around students. The research results by Situmorang *et al.* (2019) showed that a contextual approach can increase student activity in the classroom. Therefore, it is necessary to develop contextual-based comic-integrated handouts in the future.

CONCLUSIONS

Comic-integrated handouts have characteristics that include material content, entertainment elements in the form of comics, digital content such as educational video links, and online competency tests. The validation results showed a feasibility score of 75% from linguists, 78.33% from material experts, and 86.61% from media experts, which were declared feasible. In evaluating student understanding, the high understanding category increased significantly from 5.13% to 69.23%, while the low category decreased dramatically from 84.61% to 12.82%. Students in the study experienced an increase in test scores from 44.62 to 81.03. Overall, this handout scored 84.55%, which fell into the "Strongly Positive" category, signaling its

effectiveness in supporting learning, especially in the material and appearance aspects. These results indicate that the comic-integrated handout has great potential to be more widely adopted as an innovative learning tool. Further development with an improved contextual approach is expected to increase its effectiveness in supporting student understanding, especially in materials that demand interesting and interactive visualizations.

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