

COMIC MEDIA IN BIOLOGY EDUCATION BASED ON SOCIO-SCIENTIFIC ISSUES AND IT'S EFFECTIVITY: A NARRATIVE LITERATURE STUDY

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Abstract: In the learning and teaching process, students need tools that can make them easily visualize the learning they get. Coupled with the socio-scientific issues contained in the comic storyline, comics can easily enter the scope of students' reading. With the help of technology and information, educational media in the form of comics are made to increase students' awareness to live healthier, lives by staying away from things that are bad for their health. The purpose of making this article is to determine the effect of using comic media as a biology educational media, to make it easier for students to visualize biology material with the help of interesting stories and pictures based on socio-scientific issues. To collect the data, we analyze 12 article compatible with the issue by using narrative literature study method. The results of these literature study article, students are much more understanding of the concept of material and visualization of material through comic media.

Keywords: comic, biology, socio-scientific issue

Abstrak: Dalam proses belajar dan mengajar, siswa membutuhkan alat bantu yang dapat membuat mereka dengan mudah memvisualisasikan pembelajaran yang mereka dapatkan. Ditambah dengan isu-isu sosial keilmuan yang terkandung dalam alur cerita komik, komik dapat dengan mudah masuk ke dalam ruang lingkup bacaan siswa. Dengan bantuan teknologi dan informasi, media edukasi berupa komik dibuat untuk meningkatkan kesadaran siswa untuk hidup lebih sehat dengan menjauhi hal-hal yang buruk bagi kesehatan mereka. Tujuan dari pembuatan artikel ini adalah untuk mengetahui pengaruh penggunaan media komik sebagai media edukasi biologi, untuk memudahkan siswa dalam memvisualisasikan materi biologi dengan bantuan cerita dan gambar yang menarik berdasarkan isu-isu saintifik. Untuk mengumpulkan data, kami menganalisis 12 artikel yang sesuai dengan permasalahan dengan menggunakan metode studi literatur naratif. Hasil dari studi literatur ini, siswa jauh lebih memahami konsep materi dan visualisasi materi melalui media komik.

Kata Kunci: komik, biologi, isu sosiosaintifik

INTRODUCTION

Biology education plays a crucial role in enhancing students' science literacy, particularly in understanding concepts related to human health. To achieve meaningful learning, students need more than just theoretical knowledge—they must also develop critical thinking skills and awareness of real-world issues. One effective approach is integrating socio-scientific issues (SSIs) into learning, which connect science with moral and social dimensions (Wahono, et al. 2021). By engaging with these issues, students can better understand the complexities of scientific concepts while developing ethical reasoning and decision-making skills.

Educational comic media offers an innovative alternative in learning biology to convey complex material in an interesting and easy to understand manner. According to Morel (2019) this is intended to make it easier for students to understand learning material. Aqib (2013) suggests that

educational media is anything that can be used by educators to facilitate the teaching-learning process in students. By integrating visual and narrative elements, comics can help learners understand the concept of respiratory system disorders due to smoking and its social and health impacts. This literature review aims to explore the effectiveness of using educational comics in learning biology based on socio-scientific issues (Rahman, et al. 2023). Through this approach, it is hoped that biology learning will not only improve students' cognitive understanding, but also build their awareness of the negative impacts of the issues exist over the public.

According to the Indonesian Dictionary (KBBI), comic media is a form of illustrated story containing pictures and writings arranged in such a way as to form a story that is easy to digest and fun to read. Comics in the opinion of Sepriadi (2018) are not unfamiliar to young audiences, but this time the comics in question are educational comics, containing material that will make students interested in continuing to read

Rahim, et al (2017) argue that socio-scientific issues are issues that circulate among the wider community but can be explained scientifically and scientifically. An example of a socio-scientific issue related to human respiration material is smoking. Cigarettes and the myriad of health problems they contain, but people seem not to care about that until the feared chronic diseases actually occur.

We make this article in the observation we do while we were undergoing the Field Experience Program (PPL). We saw how teachers at school still using the Teacher Centered or Student-Centered method in the teaching and learning process. Inserting a little education in between the material as they taught the students. Therefore, we thought what if using comics as educational medium that has interesting stories and illustration with addition the SSI that help students visualize the material. With the help of technology and information, educational media in the form of comics are made to make it easier for students to understand the material taught at school more deeply and thoroughly. As stated by Hidayat (2019), comics have visuals that attract the attention of students compared to textbooks, which are almost 90% written. The storyline in the comic is coherent and organized, making it very easy for students to read it.

The purpose of making this article is to determine the effect of using comic as a biology education media based on socio-scientific issues that can make it easier for students to visualize and understand biology material with the help of interesting stories and illustrations.

METHOD

This article aims to determine the use of educational comic media in learning biology on respiration system material. Data collection in this article uses literature studies. We searched for references with the phrase "*Comic Media in Biology Learning Based on Socio-scientific Issues and It's Effectivity*" using the E-Resources National Library of Indonesia website. Initially, we found 56 articles from 2010 to 2025 that discussed about comics, biology education, and socio-scientific issue or SSI. With a thorough reading and observation, a total of 10 articles were considered appropriate and align with the purpose of this article.

RESULT AND DISCUSSION

Results and discussion can be made as a whole that contains research findings and explanations. Our test results are taken from several articles that are the purpose of this article. All articles that we make the main example have in common, namely using comics as a biology learning media, although they have different materials. Apart from the similarity of the media, these articles have the same goal, which is to increase the motivation of students in visualizing biology learning material and want to make it easier for teachers in the learning and teaching process.

In Hidayat's article (2019) which uses the ADDIE method (*Analyze, Design, Development, Implementation, and Evaluation*) in its research. At the implementation stage, Hidayat et al. tested the effectiveness of their comics with a control class and a treatment class. They gave a pretest with control class results of 42.67 with a standard deviation of 17.75, while the treatment class was

42.50 with a standard deviation of 19.60. The control class was then given teaching materials from school and the treatment class was given comics as teaching media. Then, at the end of learning, both classes were given a posttest with the results of the control class 68.5 with a standard deviation of 13.14 and the treatment class 73.17 with a standard deviation of 13.36. Not only with trials, Hidayat et al. also evaluated by giving questionnaires to students, the response obtained was positive with an average value of 83.3%. This explains that comics can improve student learning outcomes and student literacy interest.

Furthermore, in Oktaviana's article (2022) using the 4-D research method (*define, design, develop, and disseminate*), but the *disseminate* stage in her research was distributed to schools that were used as research objects, not on a large scale. The results obtained by the Oktaviana et al. article are data from the material expert validation stage getting a percentage of 98% with "very good" criteria, data from design expert validation getting a presentation of 93% with "very good" criteria, and data from testing on students from the data results that have been analyzed getting a percentage of 91% with "very good" criteria. This shows that comics that have passed the validity test stage are one of the learning media that are suitable for use in the teaching and learning process.

The research article by Apriyanti (2018) uses the same method as Oktaviana's article (2022), namely the 4D method with the *disseminate* stage eliminated. At the design stage (*develop*), there are two types of tests, namely the validity test which gets a percentage of 91.30% and the practicality test which gets a presentation value of 81.11% from teachers and 88.56% from students with an average value of 84.84%. Apriyanti's article answers how comics can be a good learning media to help students understand the material.

Then, in the article written by Haka (2018) which uses the *research and development* method (*Research and Development*), it has 7 stages, including 1. *Research and Development Collecting*, 2. *Planning*, 3. *Develop preliminary of product*, 4. *Preliminary field testing*, 5. *Main product revision*, 6. *Main field test*, 7. *Operational product revision*. At the 3rd stage, namely the *Develop preliminary of product* stage, there is a validity test from material experts with a percentage of 83.75%, a validity test from language experts with a percentage of 93.75%, a validity test from media experts 85.8% and a teacher response test with a percentage of 86.25%.

In the Irfana article (2017) which also uses the *Research and Development* method. The results of validation from media experts get a percentage of 92%, validation from material experts get a percentage of 89%, and validation from biology teachers get a percentage of 96%. These results are categorized as very feasible. Just like other articles, Irfana's article also passed a trial with *pretest* and *posttest* to find out before and after students were given comics as learning media. The student completeness value on the posttest reached 88.9%. This can also prove that comics are teaching media that are suitable for students to use in understanding biology subject matter.

The next article is Marwatoen's (2015) article which uses the *quasi-experiment* method. This type of experiment consists of two experimental groups, in group 1 was given the treatment of presentation learning media, while group 2 was given the treatment of comic learning media. From the data presented by Marwatoen, it can be concluded that based on the average scores of the two groups of students, group II got a higher score compared to group I. The results of this study provide another illustration of how the average score of the two groups of students can be compared. The results of this study provide another illustration of how comics can affect student learning outcomes.

Further results can be seen from the results of Haerunisa's research (2021) which uses the DBR (*Design Based Research*) method. According to Sukmansa (2017), DBR is a research approach that emphasizes the role of design as a key element in improving learning methods. In this research, there are repeated cycles of analysis, design, development, and implementation in a real environment, with the aim of building principles and theories based on findings. The results of the material expert validation get a percentage of 82.5%, the results of the media expert validation get a percentage of 80%, while the teacher's response regarding the feasibility of comics gets a percentage of 89%, the response of small-scale students gets a percentage of 88.9% and the

response of large-scale students gets a percentage of 95.3%. The results of this study received a positive response and received a very feasible category.

Abrori. et al (2024) made an article with case studies method. They said, comics serve as a promising educational tool for enhancing students' comprehension of scientific concepts and improving scientific literacy. This study focuses on the development of comics to introduce socio-scientific issues (SSI) to elementary school students, recognizing SSIs as complex societal concerns intertwined with science and encompassing diverse perspectives. A case study approach was employed to investigate the challenges students face in engaging with SSI-themed comics. Semi-structured interviews with ten participants were conducted to identify obstacles such as technical difficulties in reading comics, unfamiliarity with genre conventions, and struggles in understanding SSI content. Thematic analysis was applied to examine the collected data, revealing key challenges rooted in both the structural aspects of comics and the complexity of SSIs. These findings provide valuable insights for improving the design of educational comics and guiding future research in this field.

An article written by Gormally, C (2020) about explorations of the use of graphic memoirs to make biology more engaging and relevant for non-science majors, addressing the common issue of students perceiving science as rote memorization. By incorporating narratives into science education, the approach aims to humanize biology and connect socio-scientific issues—such as infertility, cancer, and AIDS—to students' lives. Conducted at Gallaudet University, the course utilized graphic memoirs, active learning strategies (think-pair-share, discussions), and alternative assessments (quizzes, reflective essays, and a final comic project). Additionally, using online resources instead of traditional textbooks proved cost-effective and accessible. The study concludes that graphic memoirs are a powerful tool for integrating science with real-world concerns, making the approach adaptable to various educational levels and formats. A curated list of graphic memoirs covering diverse topics like climate change, medical conditions, and environmental issues is also provided for educators interested in implementing similar methods. Results showed increased student engagement and understanding, as students related scientific concepts to personal and societal issues.

And the last is an article from Nurhakim, et al (2024) which is an article with the Narrative Literature Review research method which discusses 25 selected articles about educational comics and their effectiveness. This article shows how effective a comic is in helping the educational process of students in helping to develop their mindset and improve their learning outcomes.

From the findings of the researchers mentioned in this article, it can be seen that students are much more understanding of the concept of material and visualization of material through comic media. From the experience experienced by the researchers during the comics trial experiment at school, students gave an enthusiastic response which would then affect the results of learning. According to Silalahi (2015), increasing learning motivation due to interesting learning media is the purpose of this article.

CONCLUSION

Based on the research, all articles included in this article received a positive response from all parties, starting from the students to the teachers who gave a good response. This means that comic media is indeed very appropriate to be a medium for learning and biology education. Because comics have interesting pictures and stories, so that students can easily understand the issue of smoking that is spreading in society. Learners can also imagine some abnormalities or disorders of the respiration system caused by smoking with an interesting explanation through the stories available from comics.

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