

Innovation in Education : Preliminary Analysis for Inquiry-Based Biology Magazines

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Abstract: This research aims to describe the results of the preliminary research phase as a basis for developing inquiry-based biology magazines for eleventh-grade students at SMA 11 Pekanbaru. This type of research is a development study utilizing the Plomp development model, which consists of three stages; however, this study only reaches the first stage, the preliminary research phase. The sample size for this research is 38 eleventh-grade students from SMA 11 Pekanbaru. The research instruments include observation sheets, interview sheets, and student needs questionnaires. Most students, 92.11%, prefer to learn using image examples, indicating a preference for visual media, and 97.37% are enthusiastic about developing inquiry-based biology magazines. Based on the preliminary research phase results, it can be concluded that the students need inquiry-based biology magazines.

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Introduction

Education is a field of paramount importance and strategic significance in national development, as it is one of the determinants of a nation's progress (Yanti, 2018). Education encompasses all aspects of life, supporting individuals in choosing and nurturing a dignified existence (Makkawaru, 2019). In this context, education is a foundation for shaping human quality, fostering competitiveness, and enhancing the ability to absorb technology that can increase productivity (Assa Riswan, 2022). Through education, children can be shielded from ignorance that has the potential to undermine the nation while also developing an intelligent mindset (Irawan, 2023). Education is a learning process each individual (learner) acquires to understand, internalize, attain maturity, and hone critical thinking skills (Rahman et al., 2022). The learning process involves interaction between teachers and students, culminating in evaluating learning outcomes. In this process, the role of the teacher as a knowledge transmitter is of utmost importance (Nurfaizah & Oktavia, 2020). A teacher must master the subject matter being taught and continuously develop it to enhance their competencies, as this significantly influences learning outcomes (Windi Anisa et al., 2020). One relevant subject is biology.

Biology is a natural science that studies living organisms and their environmental interactions (Afriadi & Yuni, 2018). This discipline is part of scientific learning, where knowledge is developed and understood through scientific steps applied in practice (Ikhtiar et al., 2022). Biology learning not only focuses on mastering a collection of knowledge in the form of facts, concepts, or principles but also constitutes a process of discovery (Febrianti et al., 2018). Biology provides various experiences to understand scientific concepts and processes (Ikhtiar et al., 2022). In its implementation, biology learning is influenced by the actors (educators) and the learning resources utilized. Learning resources are essential to

education (Ahda et al., 2024). Learning resources encompass messages, individuals, materials, tools, techniques, and settings that learners utilize to enhance their learning quality (Supriadi, 2017). With the availability of learning resources, the educational process can occur effectively. Knowledge and information can be accessed more easily due to the availability of learning resources (Handoko, 2022). Learning resources are referred to as teaching aids when they function as tools to assist learning and as media when they are an integral part of the entire process or activity. Learning media serve as both a teacher and a source of knowledge for learners (Sidiq & Rif, 2022).

Learning media encompass everything that can be used to convey messages from teachers to students, thereby stimulating students' thoughts, feelings, attention, and interests towards an optimal learning process (Amaliah, 2022). Learning media provide a systematic framework and representation in teaching and learning (Ani Daniyati et al., 2023). Learning media are not merely supplements but are also determining factors for success in the classroom learning process (Aghni, 2018). Therefore, the role of learning media is crucial for educators and learners to ensure that the teaching and learning process can proceed more effectively and foster students' interest in learning (Afriadi & Yuni, 2018). Learning media is a means of teaching and learning (Ramadani et al., 2023). Teachers can utilize various types of media to enhance the quality and interest of learners in the learning process. Types of learning media can be categorized into three categories based on their nature, reach, and usage (Dwi et al., 2021). Among the various classifications of media proposed by experts, there are five categories of learning media based on physical characteristics, types and levels of experiences gained, sensory perceptions, usage, and hierarchy of utilization. Generally, there are four types of learning media: visual media, audio media, audiovisual media, and multimedia (Silahuddin et al., 2022).

Magazines serve as learning resources that cultivate students' interest in subjects and assist their understanding of complex material (Nursandi et al., 2023). As a print-based medium, magazines present content and images in an attractive and simple format, facilitating the comprehension of concepts (Pratiwi et al., 2017). By utilizing magazines as learning resources, students can acquire information more easily (Reflihadi, 2020). Relevant research conducted by Sri Yunarti (2015) demonstrated that the use of the BioMagz magazine is effective in improving the biology learning outcomes of tenth-grade students at SMAN 2 Banguntapan, with a p-value less than 0.05 ($0.018 < 0.05$). The use of the BioMagz magazine also received positive feedback from tenth-grade students at SMAN 2 Banguntapan. Based on this, this research aims to describe the initial research phase results as a basis for developing inquiry-based biology magazines for eleventh-grade students at SMA 11 Pekanbaru.

Research Method

This type of research is a development study that adopts the Plomp model, which consists of three stages: the preliminary investigation stage, the prototype phase, and the assessment phase. In this study, only the preliminary investigation stage was conducted. The objective of the preliminary investigation stage is to establish and define the requirements for developing the inquiry-based biology magazine. The preliminary stage has three main steps: observation, interviews with students and biology teachers, and analysis of the needs of eleventh-grade students at SMA 11 Pekanbaru. The subjects of this research are 38 eleventh-grade students from SMA 11 Pekanbaru who were asked to complete a questionnaire

regarding the need for the inquiry-based biology magazine to be developed. The data collected in this study consists of qualitative data obtained through interview sheets, observation sheets, and questionnaires. The interview sheets comprise two sections: one for teachers with 23 items of questions and one for students with 25 items of questions. The classroom observation sheet contains 24 statement items, while the student needs questionnaire consists of 12 questions.

The data analysis technique employed in this research is descriptive data analysis. According to Sastroadmojo (2018), the researcher converted the data into percentage form using the percentage formula to analyze the obtained questionnaire data.

$$P = \frac{F}{N} \times 100\%$$

Description:

P= Percentage

F= Frequency of answer score

N= Number of respondents

Data processing of the research results was then converted based on the assessment criteria category according to Agus & Fahriqi (2020); the data was interpreted into five levels, namely:

Table 1. Interpretation values

Percentage	Category
81%-100%	Very high
61%-80%	High
41%-60%	Medium
21%-40%	Low
0%-20%	Very low

Source: Agus & Fahriqi (2020)

Result and Discussion

Results of Observations and Interviews with Students and Biology Teachers

Based on the observations and interviews conducted by the researcher with students and biology teachers, several issues related to the biology learning process in the classroom and its correlation with learning outcomes were identified. Firstly, the learning media used were deemed sufficiently helpful; however, teachers still require additional media to assist in delivering the material and facilitating students' understanding. Secondly, the methods and models of instruction employed in the learning process are still somewhat limited in variety, predominantly relying on lecture methods with occasional discussion methods. Thirdly, the circulatory system is considered a challenging topic by students, particularly the mechanisms involved, due to the numerous components and complex scientific terminology that are difficult to remember. This is evidenced by the daily test results on the circulatory system material, which were below average for the students.

Analysis of Student Needs Questionnaire

The needs analysis results were completed by 38 students, comprising 12 items of questions regarding the learning media and the learning activities conducted by students in the classroom. The results of the student needs questionnaire can be seen in Table 2 as follows.

Table 2. Indicators of Student Needs for Biology Magazine Based on Guided Inquiry

No	Questions/Statements	Student's Responses	
		Yes	No
1.	Do you often use learning media such as videos, animations, or games for studying?	94,74%	5,26%
2.	Do you feel that learning media makes the subject matter easier to understand?	97,37%	2,63%
3.	Are you more interested in learning when using learning media?	100%	0%
4.	Do you feel that learning media makes the learning process more enjoyable?	100%	0%
5.	Do you prefer learning to use image examples?	92,11%	7,89%
6.	Does the printed book you use have an attractive colour combination?	50%	50%
7.	Do you have difficulty accessing the learning media you need?	26,32%	73,68%
8.	Would you like learning media that can be accessed anytime and anywhere?	100%	0%
9.	Would you like to learn about media that can be used offline?	76,32%	23,68%
10.	Do you tend to get bored more quickly when learning using lecture methods?	81,58%	18,42%
11.	During the learning process, do all students participate/engage actively?	44,74%	55,26%
12.	Do you agree with the development of inquiry-based biology magazines?	97,37%	2,63%
Total		80,04%	19,95%

Based on the results of the student needs questionnaire regarding the inquiry-based biology magazine as a learning media, it is evident that learning media plays a crucial role in the educational process. The overall results of the media needs questionnaire indicate that 80.04% of the responses were positive, reflecting a high level of enthusiasm among students for developing innovative learning media such as biology magazines. All students (100%) expressed their interest in learning media that can make learning more enjoyable and can be accessed flexibly, anytime and anywhere. Students are more attracted to learning media because they can enhance the learning experience through engaging visuals, sounds, or

animations, facilitating their understanding of the material. Using media, students are more motivated to learn, encouraging them to write, speak, and stimulate their imagination (Nurfadhillah et al., 2021). Furthermore, flexible access allows them to learn at any time and place, accommodating their needs and comfort without being restricted to specific times or locations. Media are also required to possess flexible characteristics, meaning they should be able to adapt to the evolving situations of their users, such as being accessible anytime and anywhere through mobile phones, which have become an everyday necessity for everyone. When utilized wisely, individuals can share ideas, access information, engage in learning, and much more (Rashid, 2021).

A total of 97.37% of students acknowledged that learning media significantly assists them in understanding the subject matter, with 94.74% being accustomed to using media such as videos, animations, or games in the learning process. Learning media greatly aids students in comprehending material by visualizing abstract concepts clearly through images, videos, or animations, providing interactive experiences that allow students to learn while practising, capturing attention with creative presentations that enhance focus and motivation, and simplifying complex explanations for better understanding. Learning media can enrich students' learning experiences through images, videos, and audio that facilitate a better understanding of concepts (Amanah, 2023). Most students, 92.11%, prefer to learn using image examples, indicating a preference for visual media. Although 50% of students believe their printed books have an attractive colour combination, and the other 50% disagree, they still desire more interactive media. Students prefer learning with image examples because images can clearly and concretely visualize information, helping them grasp abstract concepts more easily. Additionally, images capture attention and can enhance interest in learning, especially for students with visual learning styles, who find it easier to absorb information through images than text. Images also enable students to remember information better, as the brain tends to recall visuals more easily than words. Pictorial media can be used to convey messages from the sender to the receiver, thereby stimulating students' thoughts, feelings, and attention to achieve specific educational goals (Imron, 2023).

Next, there is a concern regarding the low level of active participation among students in the learning process, with only 44.74% of students feeling that all participants are actively engaged. 81.58% of students admitted to becoming bored with traditional lecture methods. Lecture methods are often perceived as tedious because teachers deliver unilaterally, without physical interaction, leading students to mentally disengage from classroom activities, often distracted or drowsy due to unengaging teaching (Arini, 2022). In terms of accessibility to learning media, 73.68% of students reported no difficulties in accessing the learning media; however, 76.32% still expressed a desire for offline media options. Students did not encounter challenges in accessing learning media during the learning process, as modern learning media are often designed for easy access through various devices, such as computers, tablets, or mobile phones. Additionally, many learning media can be accessed online anytime and anywhere, allowing students to learn at their convenience without being constrained by time or location. User-friendly designs also facilitate students' understanding of how to use the media without confusion. Finally, 97.37% of students are enthusiastic about developing inquiry-based biology magazines. The percentage of the results from the student needs questionnaire can be seen in Figure 1.

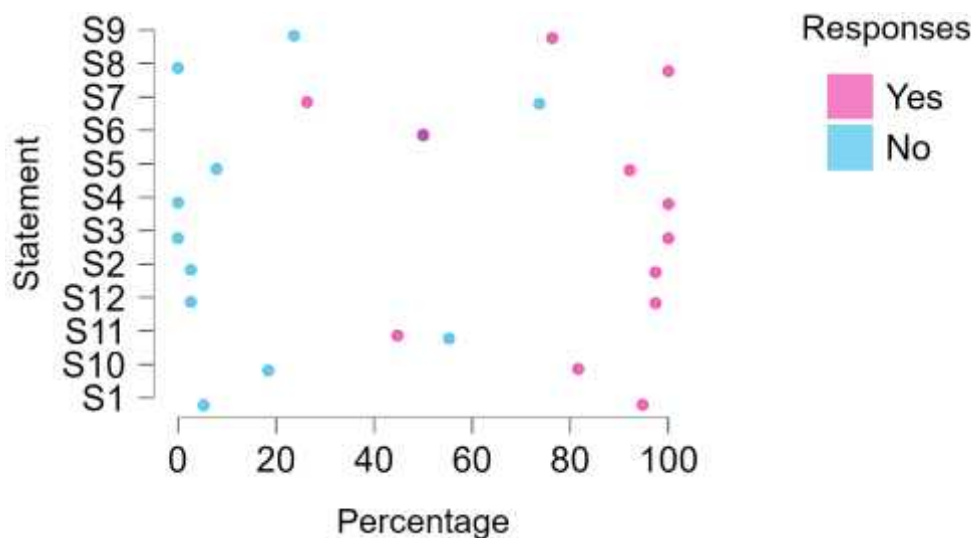


Figure 1. Results of the Student Needs Questionnaire

Conclusion

Based on the results of observations and interviews conducted with students and biology teachers, as well as the analysis of the student needs questionnaire, it can be concluded that there are several significant challenges in the biology learning process in the classroom. Although the existing learning media are helpful, teachers still require additional media variations to enhance student understanding. The teaching methods, which tend to be monotonous, particularly the reliance on lectures, contribute to the low level of active student participation, with 81.58% of students reporting that they become quickly bored. Topics considered difficult, such as the circulatory system, demonstrate below-average learning outcomes, indicating the need for a more interactive and engaging approach. The questionnaire results reveal that 97.37% of students agree that innovative learning media, such as inquiry-based biology magazines, are essential for improving their motivation and understanding. Students strongly prefer visual and interactive media that can be accessed flexibly, thereby supporting their diverse learning needs. Consequently, developing more varied and engaging learning media is crucial for enhancing the quality of biology education in the classroom.

References

- Afriadi, R., & Yuni, R. (2018). Pengembangan Jiwa Bioentrepreneur Mahasiswa Biologi. *Jurnal Biolokus*, *1*(2), 123.
- Aghni, R. I. (2018). Fungsi Dan Jenis Media Pembelajaran Dalam Pembelajaran Akuntansi. *Jurnal Pendidikan Akuntansi Indonesia*, *16*(1). <https://doi.org/10.21831/jpai.v16i1.20173>
- Ahda, H., Khairani, I., Yusnaldi, E., Harry, K. D., Fatimah, S., & Lestari, T. D. (2024). Sumber Belajar pada Pembelajaran IPS di MI atau SD. *El-Mujtama: Jurnal Pengabdian Masyarakat*, *4*(3), 198–206. <https://doi.org/10.47467/elmujtama.v4i3.1279>
- Amaliah. (2022). Kemampuan Guru dalam Mengembangkan Media Pembelajaran Interaktif pada Pembelajaran Tematik melalui Bimbingan Teknis Media Pembelajaran di SD Negeri Cipayung Sukmajaya Kota Depok. *Formosa Journal of Applied Sciences*,

- 1(5), 849–862. <https://doi.org/10.55927/fjas.v1i5.1605>
- Amanah. (2023). *Mengoptimalkan Penggunaan Media Pembelajaran Dalam Proses Belajar*. 1–8.
- Ani Daniyati, Ismy Bulqis Saputri, Ricken Wijaya, Siti Aqila Septiyani, & Usep Setiawan. (2023). Konsep Dasar Media Pembelajaran. *Journal of Student Research*, 1(1), 282–294. <https://doi.org/10.55606/jsr.v1i1.993>
- Arini. (2022). *Penerapan Metode Ceramah Dalam Meningkatkan Hasil Belajar Dan Pembelajaran Siswa Smp*. <https://doi.org/10.31219/osf.io/vcmn4>
- Assa Riswan. (2022). *Jurnal Ilmiah Society. Faktor Penyebab Anak Putus Sekolah Di Desa Sonuo Kecamatan Bolangitang Barat Kabupaten Bolaang Mongondow Utara*, 2(1), 1–12.
- Dwi, V., Endang, W., Surya, Y. F., & Rusdial, M. (2021). Learning Media, Indonesian Language Teaching. *Pendidikan Rokania*, 6(2), 262–272. <http://ejournal.stain.sorong.ac.id/indeks.php/al-riwayah>
- Febrianti, E. S., Karyadi, B., & Kasrina, K. (2018). Penerapan Model Kooperatif Tipe-Group Investigation (Gi) Pada Materi Sistem Ekskresi Manusia Untuk Meningkatkan Hasil Belajar Siswa Kelas Xi Ipa Sma N 8 Kota Bengkulu. *Diklabio: Jurnal Pendidikan Dan Pembelajaran Biologi*, 2(1), 10–14. <https://doi.org/10.33369/diklabio.2.1.10-14>
- Handoko, S. B. S. K. (2022). Konsep Pengembangan Sumber Belajar Suryawan. *Jurnal Pendidikan Dan Konseling*, 4(6), 11275–11286.
- Ikhtiara, T., Jaya, A., Zahratina, H. R., Madalena, D. K., Putri, N., & Suryanda, A. (2022). Analisis Implementasi Kurikulum Merdeka pada Pembelajaran Biologi di Sekolah Urban. *Jurnal Penelitian, Pendidikan Dan Pengajaran: JPPP*, 3(3), 216–224. <https://doi.org/10.30596/jppp.v3i3.12940>
- IMRON, I. (2023). Penerapan Media Cerita Bergambar Untuk Meningkatkan Minat Belajar Sejarah Siswa Kelas Xi Ips-2 Man Kota Pasuruan. *SOCIAL: Jurnal Inovasi Pendidikan IPS*, 2(4), 231–239. <https://doi.org/10.51878/social.v2i4.1806>
- Irawan, L. A. dan dodii. (2023). Pentingnya Mengenalkan Alqur'an Sejak Dini Melalui Pendidikan Agama Islam. *Jurnal Pendidikan Indonesia(PJPI)*, 1(1), 13–20. <https://doi.org/10.00000/pjpi.xxxxxxxx>
- Makkawaru, M. (2019). Pentingnya Pendidikan Bagi Kehidupan dan Pendidikan Karakter dalam Dunia Pendidikan. *Jurnal Konsepsi*, 8(3), 1–4.
- Nurfadhillah, S., Ulfah, M., Nikmah, S. Z., & Fitriyani, D. (2021). Peranan Media Pembelajaran Dalam Meningkatkan Minat Siswa Serta Memotivasi Belajar Siswa Kelas 3 Sdn Kohod Iii. *BINTANG: Jurnal Pendidikan Dan Sains*, 3(2), 260–271. <https://ejournal.stitpn.ac.id/index.php/bintang>
- Nurfaizah, S., & Oktavia, P. (2020). Proses Pembelajaran Siswa Sekolah Dasar di MI Nurul Hikmah. *As-Sabiqun*, 2(1), 43–48. <https://doi.org/10.36088/assabiqun.v2i1.621>
- Nursandi, A. D., Utomo, A. P., & ... (2023). Pengembangan Sumber Belajar Majalah Pembelajaran Biologi Berbasis Eksplorasi Tumbuhan Obat Masyarakat Desa Kalibaru Kulon Banyuwangi. *Journal of Natural ...*, 4(2), 52–62. <https://doi.org/10.34007/jonas.v4i2.385>
- Pratiwi, N., Hamidah, A., & Pengajar Prodi Pendidikan Biologi FKIP Unja, S. (2017). Pengembangan Majalah Biologi Sebagai Media Pembelajaran Pada Pokokbahasan Protista Kelas X Mia Di Sma N 7 Kota Jambi Development of Biology Magazine As a Learning Media on Protist Topic Material for X Mia Class in Senior High School 7

- Jambi City. 3(1), 27–34.
- Rahman, A., Munandar, S. A., Fitriani, A., Karlina, Y., & Yumriani. (2022). Pengertian Pendidikan, Ilmu Pendidikan dan Unsur-Unsur Pendidikan. *Al Urwatul Wutsqa: Kajian Pendidikan Islam*, 2(1), 1–8.
- Ramadani, A. N., Kirana, K. C., Astuti, U., & Marini, A. (2023). Pengaruh Penggunaan Media Pembelajaran Terhadap Dunia Pendidikan (Studi Literatur). *Jurnal Pendidikan Dasar Dan Sosial Humaniora*, 43(4), 342–346.
- Reflihadi, R. (2020). Pengembangan Majalah Biologi Materi Keselamatan Kerja di Laboratorium Biologi untuk Siswa Kelas XI Pertanian SMK Negeri 4 Muaro Jambi. *Jurnal Ilmiah Dikdaya*, 10(2), 181. <https://doi.org/10.33087/dikdaya.v10i2.174>
- Sidiq, E. I., & Rif, C. (2022). Sumber Belajar dan Alat Peraga Sebagai Media Pembelajaran. *Jurnal Edukasi Nonformal*, 2(2), 596.
- Silahuddin, A., Misbahul, S., Gumawang, U., Desa, B. J. I., Merah, T., Belintang, K., Raya, M., Oku, K., & Sumatera-Selatan, T. P. (2022). Pengenalan Klasifikasi, Karakteristik, Dan Fungsi Media Pembelajaran MA Al-Huda Karang Melati. *Idaarotul Ulum (Jurnal Prodi MPI)*, 4(02 Desember), 162–175. <https://jurnal.insanprimamu.ac.id/index.php/idaarotul/article/view/244>
- Supriadi, S. (2017). Pemanfaatan Sumber Belajar Dalam Proses Pembelajaran. *Lantanida Journal*, 3(2), 127. <https://doi.org/10.22373/lj.v3i2.1654>
- Windi Anisa, F., Ainun Fusilat, L., & Tiara Anggraini, I. (2020). Proses Pembelajaran Pada Sekolah Dasar. *Jurnal Pendidikan Dan Ilmu Sosial*, 2(1), 158–163. <https://ejournal.stitpn.ac.id/index.php/nusantara>
- Yanti, A. (2018). Pengembangan Media Pembelajaran Biologi Berbasis Ulead Video Studio 11. *EDU-BIO Jurnal Pendidikan Biologi*, 1(1), 7–18. <https://edubio.ftk.uinjambi.ac.id/index.php/edubio/Authorguidelines>