PUSTAKA DIDAKTIS
JURNAL MEDIA DAN MODEL PEMBELAJARAN

Vol.1, No.2 (January – 2026)
E-ISSN: 3110-1429
pp.71-79

Needs Analysis for the Development of Interactive Animation-Video–Based Media for Grade XI Senior High School Students

Sheilla Chaerunissa Kurnia Dewi, Nurkhairo Hidayati
Biology Education, Faculty of Teacher Training and Education, Universitas Islam Riau
*Corresponding Author: sheilla.ckd@gmail.com

Abstract
This study aimed to analyze teachers' and students' needs regarding the development of interactive animation-video–based learning media for the circulatory system topic for Grade XI senior high school students in the 2025/2026 academic year. The study employed a descriptive approach using a survey method. The participants comprised two biology teachers and 30 Grade XI students from SMA Negeri 1 Pekanbaru and SMA Negeri 3 Siak Hulu. Data were collected through interviews, a student needs questionnaire, and documentation, and were analyzed descriptively using quantitative and qualitative techniques. The findings indicate that teachers require learning media that are more structured, interactive, and aligned with learning outcomes because the currently used media have not been optimal in supporting students' understanding of the circulatory system concepts, which are largely abstract. Student questionnaire results show that all need indicators fall into the "Needed" category, including the need for engaging interactive media (68%), curriculum alignment (67%), students' readiness and learning interest (73%), and the effectiveness of animation media for comprehension and learning outcomes (70%). These results suggest that the development of interactive animation-video–based media is relevant to support effective biology learning consistent with the demands of 21st-century education.

Article History
Received: January, 2026
Reviewed: January, 2026
Published: January, 2026

Key Words
Needs analysis, interactive animation, video-based learning, instructional media development, senior high school students.

How to Cite: Dewi, S. C. K., & Hidayati, N. (2026). Needs Analysis for the Development of Interactive Animation-Video–Based Media for Grade XI Senior High School Students. *PUSTAKA DIDAKTIS: Jurnal Media dan Model Pembelajaran, 1*(2). 71-79.

INTRODUCTION

The rapid development of science and technology in the digital era has driven substantial transformations in science learning, including biology, through the use of interactive digital media (Ahmad et al., 2024). The integration of text, images, audio, and animation within a single media environment has been shown to enhance students' engagement, motivation, and conceptual understanding because learning becomes more appealing and meaningful (Putra et al., 2024; Yana & Khairuna, 2024). Prior studies report that interactive animated videos effectively improve learning outcomes and facilitate understanding of abstract concepts across subjects, such as integrated science (IPAS) with problem-based learning (Dewi & Isdaryanti, 2025), renewable energy topics in elementary schools (Handayani et al., 2025), lithosphere dynamics in geography (Faradella & Ningrum, 2025), social studies through storytelling animation (Ayuni et al., 2025), and digital literacy enhancement via Canva-based animated videos (Diniyati & Mastoah, 2025). In biology education, interactive animated videos developed using platforms such as Canva, Articulate Storyline, and other video-authoring applications have been implemented to enrich learning experiences and prepare students for the demands of 21st-century learning (Wahyudi et al., 2025; Yanti, 2025; Sari, 2025; Alonemarera et al., 2025).

PUSTAKA DIDAKTIS
JURNAL MEDIA DAN MODEL PEMBELAJARAN
Vol.1, No.2 (January – 2026)
E-ISSN: 3110-1429
pp.71-79

Specifically, learning the circulatory system presents distinct challenges because it involves bodily structures and physiological processes that cannot be directly observed. Consequently, students often perceive the topic as abstract and difficult (Widdiyana & Kristanto, 2024). This challenge is compounded when teaching remains dominated by lecture-based approaches and conventional media (e.g., PowerPoint slides and worksheets), which can reduce student participation and contribute to low conceptual understanding (Fitria et al., 2023; Yana & Khairuna, 2024). Several studies have developed animated video media for the circulatory system, including audiovisual learning media based on Articulate Storyline 3 (Azizah et al., 2025), CapCut-based instructional videos with established validity (Darina & Halidjah, 2025), and analyses of YouTube animated videos as biology learning resources in senior high schools (Alfira & Ardi, 2025). More broadly, interactive animated videos have also been developed for topics such as the classification of living things (Permatasari et al., 2025) and the human locomotion system, including approaches oriented to Balinese local culture "Tari Pendet" (Sari, 2025; Dewi et al., 2025). Across these contexts, findings consistently show that animated media can help students visualize abstract biological concepts, increase learning interest, and strengthen retention (Putri et al., 2023; Fitria et al., 2023; Putra et al., 2024; Handayani et al., 2025).

Nevertheless, many prior studies emphasize product design and effectiveness testing. In contrast, comprehensive needs analyses involving both teachers and students within specific contexts, such as Grade XI senior high school biology for the circulatory system, remain relatively limited. Needs analysis is a crucial stage in educational development research to ensure that the resulting media are relevant to learner characteristics, school contexts, and the prevailing curriculum (Warow & Yalindua, 2025). Evidence from animation-video development studies across educational levels underscores the importance of aligning media with authentic field needs (Dewi & Isdaryanti, 2025; Faradella & Ningrum, 2025; Ayuni et al., 2025; Permatasari et al., 2025; Handayani et al., 2025), including to mitigate learning fatigue and foster active engagement (Alonemarera et al., 2025; Diniyati & Mastoah, 2025). Accordingly, conducting a needs analysis for developing interactive animation-video–based media on the circulatory system for Grade XI students is urgent so that the proposed solution is not only technologically innovative but also practical, contextual, and responsive to the complex challenges of biology learning in classrooms.

RESEARCH METHOD

Research Design

This study employed a descriptive approach using survey research to obtain a comprehensive picture of teachers' and students' needs regarding the development of interactive animation-video–based media for the circulatory system topic. A descriptive design was selected because it can systematically and factually portray real conditions in the field in line with the objective of needs analysis, namely, mapping learning situations, constraints, and user needs without applying any intervention to participants (Putri et al., 2023). Survey methods are widely used in educational development contexts to identify problems, barriers, and user preferences related to digital learning media so that the resulting information can serve as the basis for designing relevant and contextual products (Warow, Yalindua, & Warouw, 2025).

Participants, Setting, and Data Collection Procedures

Participants consisted of biology teachers and Grade XI students from senior high schools in Pekanbaru and Siak Hulu who had learned the circulatory system topic. A

Vol.1, No.2 (January – 2026)
E-ISSN: 3110-1429
pp.71-79

purposive sampling technique was used, considering that the involved teachers and students had direct experience and engagement with learning the topic (Putra et al., 2024). The planned sample included two biology teachers and 30 Grade XI students (Yana & Khairuna, 2024). Data were collected using a needs questionnaire, interviews, and documentation. The questionnaire was developed based on learning-need indicators, including the availability of learning media, students' difficulty in understanding the circulatory system, teacher and student preferences for interactive-media features, and the need to visualize abstract concepts that cannot be directly observed (Warow, Yalindua, & Warouw, 2025). Semi-structured interviews were conducted with biology teachers to explore constraints in teaching the circulatory system, instructional strategies used to date, and expectations regarding the characteristics of the animated video media to be developed. Documentation (e.g., teaching materials and other learning devices) was used to examine the alignment of the prospective media with the curriculum and topic characteristics (Yana & Khairuna, 2024).

Data Analysis Techniques and Need-Assessment Criteria

Data were analyzed descriptively using quantitative and qualitative approaches. Questionnaire data were analyzed using descriptive statistics (percentages) to identify trends in teacher and student needs for interactive animation-video–based media. Percentage scores were calculated using the following formula: Percentage score = (obtained score / maximum score) × 100%. The questionnaire comprised 20 items with four response options on a Likert scale: 1 (strongly disagree), 2 (disagree), 3 (agree), and 4 (strongly agree). Percentage results were interpreted into five need categories: 0%–20% (very low need), 21%–40% (low need), 41%–60% (moderate need), 61%–80% (needed), and 81%–100% (highly needed) (Much et al., 2016). Qualitative data from interviews were analyzed through data reduction, data display, and conclusion drawing to reveal patterns of media needs in greater depth (Putri et al., 2023). Documentation data were used to confirm the consistency between identified needs and curriculum documents, as well as existing teaching resources. Data triangulation was conducted by comparing findings from questionnaires, interviews, and documentation to strengthen the validity of the study results (Fitria et al., 2023).

RESULT AND DISCUSSION

Teachers' Needs for the Development of Interactive Animation-Video–Based Media on the Circulatory System Topic

Teachers' needs were examined through semi-structured interviews with Grade XI biology teachers at SMA Negeri 1 Pekanbaru and SMA Negeri 3 Siak Hulu. The interviews explored teaching methods, learning media, interactive media, curriculum-media alignment, and constraints in teaching the circulatory system. The interview results indicate that teachers require more effective and interactive learning media to support curriculum implementation (see Tables 1 and 2).

Table 1. Summary of Teacher Interview Responses (SMA Negeri 1 Pekanbaru)

No.	Question	Response
1	What teaching methods do you use to teach the circulatory system topic?	Discussion, practicum, and Q&A.
2	Have the learning media used so far been effective in helping students understand the material?	The media used are PowerPoint, sometimes varied, and fairly effective.

Vol.1, No.2 (January – 2026)
E-ISSN: 3110-1429
pp.71-79

No.	Question	Response
3	What constraints do you face when teaching the circulatory system topic?	Students' level of understanding, the media are only 2D, and have limited facilities.
4	How do students respond to the media used so far?	25% are enthusiastic and focused; 25% are neutral; 25% are indifferent; and 25% are sometimes enthusiastic and sometimes not.
5	Have you used animation-video–based media in biology learning?	Yes, videos from YouTube, but they were not aligned with what I wanted to teach.
6	In your opinion, are interactive media needed for biology learning?	Highly needed.
7	What is your view on the effectiveness of animated videos in explaining biological processes?	Less effective based on what has been used; many videos are either too general or too detailed.
8	What type of media do you expect can help students understand the circulatory system topic?	Media aligned with learning outcomes, aligned with the teaching module, and specific.
9	Do you have the skills to use interactive digital media in class?	Yes.
10	How important is training in using digital media for biology teachers?	Very important, especially in 21st-century learning.
11	Are the learning media used aligned with the current curriculum?	Generally aligned, but not fully suited to what needs to be conveyed.
12	How do you ensure that media content matches the biology learning objectives in senior high school?	By reviewing the media content and observing students' responses/achievement of objectives.
13	Do you find it difficult to align digital media with learning outcomes?	Yes, it is very difficult to find and match media to the learning outcomes.
14	Can animated videos help explain basic competencies in the biology curriculum?	Yes, especially by increasing students' interest.
15	To what extent can interactive media support project-based learning or practicum?	Supportive; for practicum, it can be a guide; for projects, it can provide an overview.
16	What are your expectations for developing interactive animation-video–based media at school?	Systematic progression from simple to complex; clear and varied visuals; aligned with targets.
17	How can animated media be integrated effectively into learning?	Through various features that may be available in the animation media.
18	What features should be included in interactive biology media?	Topic-specific; include worksheets (LKPD), practice questions, real-life application guidance, reflection, and long-term accessibility.
19	How can interactive media help improve student learning outcomes?	By increasing students' interest, they enjoy learning more.
20	Would you be willing to use and evaluate the interactive media developed later?	Very willing.

PUSTAKA DIDAKTIS
JURNAL MEDIA DAN MODEL PEMBELAJARAN
Vol.1, No.2 (January – 2026)
E-ISSN: 3110-1429
pp.71-79

Table 2. Summary of Teacher Interview Responses (SMA Negeri 3 Siak Hulu)

No.	Question	Response
1	What teaching methods do you use to teach the circulatory system topic?	Discussion, lecture, and others.
2	Have the learning media used so far been effective in helping students understand the material?	It depends on the students—whether they are interested.
3	What constraints do you face when teaching the circulatory system topic?	Students' level of understanding.
4	How do students respond to the media used so far?	Responses can be positive (interested) or negative (not wanting to engage because they are not interested).
5	Have you used animation-video–based media in biology learning?	Yes, but the videos were taken from other platforms and not self-produced.
6	In your opinion, are interactive media needed for biology learning?	Highly needed.
7	What is your view on the effectiveness of animated videos in explaining biological processes?	Very good; students can think more critically.
8	What type of media do you expect can help students understand the circulatory system topic?	It should be varied; an animated video can be used.
9	Do you have the skills to use interactive digital media in class?	Most can use them, but not all can create them.
10	How important is training in using digital media for biology teachers?	Very important; it broadens knowledge; often, only IT staff get training while teachers do not.
11	Are the learning media used aligned with the current curriculum?	Yes.
12	How do you ensure that media content matches the biology learning objectives in senior high school?	Alignment should be stated in the lesson plan (RPP) as a teaching reference.
13	Do you find it difficult to align digital media with learning outcomes?	Yes, not all teachers are IT-literate, and many external videos do not match what is needed.
14	Can animated videos help explain basic competencies in the biology curriculum?	Yes, they can.
15	To what extent can interactive media support project-based learning or practicum?	Not yet tried/implemented.
16	What are your expectations for developing interactive animation-video–based media at school?	It should help teachers' instruction and foster students' interest so they are more active in class.
17	How can animated media be integrated effectively into learning?	It must be designed carefully and aligned with the curriculum; include it in the lesson plan (RPP).
18	What features should be included in interactive biology media?	Quizzes, games, and projects related to the learning video.

PUSTAKA DIDAKTIS
JURNAL MEDIA DAN MODEL PEMBELAJARAN
Vol.1, No.2 (January – 2026)
E-ISSN: 3110-1429
pp.71-79

No.	Question	Response
19	How can interactive media help improve student learning outcomes?	Well-designed interactive media can increase activity because students are attracted to the animation and features.
20	Would you be willing to use and evaluate the interactive media developed later?	God willing, very willing—especially to advance education and create engaging learning.

Overall, teachers expect learning media that are more effective, structured, and interactive to help students understand the circulatory system in accordance with the curriculum. Existing media such as PowerPoint and online videos are viewed as somewhat helpful, yet insufficient to meet instructional needs and learners' development. Teachers reported constraints including heterogeneous student understanding, limitations of two-dimensional media, and difficulties in finding specific materials aligned with learning outcomes and teaching modules. Therefore, developing interactive animation-video–based media organized from basic to advanced concepts is considered essential to make learning clearer and more contextual.

Interview results also show that students' responses to current learning media vary from highly engaged to indifferent. Teachers perceive that animated videos have strong potential to increase students' interest and focus, but their effectiveness depends heavily on the degree to which the content matches instructional objectives. Currently available animated videos are often too general or overly complex, limiting their value for deep conceptual understanding. Tailored interactive media aligned with the curriculum, learning outcomes, and students' needs are expected to improve engagement and critical thinking.

Teachers further noted that interactive animation-video–based media could support project-based learning and practicum, particularly as an initial resource or procedural guide. To be maximally useful, the media should include supporting features such as student worksheets (LKPD), practice items, quizzes, games, projects, reflection, and explicit connections to everyday life contexts. Media that are easy to access and integrated with lesson plans or teaching modules are expected to facilitate implementation. Consequently, interactive media designed according to real classroom needs represent a practical solution to enhance the quality of biology learning in senior high schools.

Students' Needs for the Development of Interactive Animation-Video–Based Media on the Circulatory System Topic

A needs questionnaire was administered to 30 Grade XI students. The detailed results are presented in Table 3.

Table 3. Student Needs Questionnaire Results

No.	Indicator	Score	Category
1	Students' need for engaging interactive media that support understanding.	68%	Needed
2	Alignment of media with the curriculum and characteristics of the circulatory system material.	67%	Needed
3	Students' readiness and perceptions of learning interest and engagement when using interactive media.	73%	Needed
4	Effectiveness of animation media for comprehension and learning outcomes.	70%	Needed

Vol.1, No.2 (January – 2026)
E-ISSN: 3110-1429
pp.71-79

Based on the student needs survey, all four indicators fall within the "Needed" category, indicating that students genuinely require interactive learning media for biology, particularly for the circulatory system topic. The indicator concerning engaging interactive media that support understanding obtained 68%, suggesting that conventional media have not adequately met learners' needs. Interactive digital media integrating text, images, animation, and video are consistent with multimedia learning principles, wherein multi-representational information presentation can enhance conceptual understanding and reduce misconceptions about abstract topics such as the circulatory system (Yana & Khairuna, 2024).

The indicator of media alignment with the curriculum and the characteristics of the circulatory system material received 67% and was also categorized as "Needed." This implies that students require not only visually appealing media but also media that are aligned with instructional objectives and learning outcomes mandated by the curriculum. Interactive media structured to match topic organization, learning contexts, and senior high school learner characteristics can facilitate meaningful knowledge construction. Prior research emphasizes that curriculum alignment is essential for improving learning effectiveness and helping students understand relationships among biological concepts (Fitria et al., 2023).

The highest score was observed for students' readiness and perceptions of learning interest and engagement (73%), indicating that most students are prepared to use digital learning media and show higher learning interest when supported by interactive resources. Contemporary learners are generally accustomed to digital devices; thus, interactive media can enhance active participation, sustained attention, and cognitive engagement during instruction (Putri et al., 2023).

Finally, the perceived effectiveness of animation media for comprehension and learning outcomes (70%) suggests that students view animated media as an effective means to understand complex biological processes that cannot be directly observed. Animated visualizations can present pathways and mechanisms dynamically, supporting students' conceptual understanding. Systematic and interactive animated media have been reported to improve biology learning outcomes and reduce cognitive load in abstract topics (Warow et al., 2025). Overall, interactive animation-video–based media represent a relevant and innovative solution to support 21st-century biology learning, improve instructional quality, assist teachers in contextual explanation, and enhance students' understanding and motivation in line with curricular demands.

CONCLUSION

Based on the needs analysis of teachers and students, the development of interactive animation-video–based media for the circulatory system topic is strongly needed for Grade XI biology learning in the 2025/2026 academic year. Biology teachers reported the need for more effective, structured, and interactive learning media because the currently used media (e.g., PowerPoint and online platform videos) have not sufficiently explained abstract concepts, aligned with learning outcomes, or optimized student engagement. Interview findings also indicate constraints such as diverse student comprehension levels, limitations of two-dimensional media, and teachers' difficulty in locating media aligned with the curriculum and teaching modules. Student questionnaire results further show that all indicators fall into the "Needed" category, including the need for engaging interactive media that support understanding (68%), curriculum alignment and topic characteristics (67%), student readiness and learning interest (73%), and the effectiveness of animation media for comprehension and learning outcomes (70%). These findings indicate that students require

Vol.1, No.2 (January – 2026)
E-ISSN: 3110-1429
pp.71-79

innovative media that can dynamically visualize circulatory processes, increase learning interest and engagement, and facilitate understanding of complex biological concepts that cannot be directly observed.

RECOMMENDATIONS

Based on these findings, future development of interactive animation-video–based media should prioritize alignment with the curriculum, instructional objectives, and the characteristics of the circulatory system topic. The media should be organized systematically from simpler concepts to more complex ones and should include clear, engaging, and easy-to-follow animations. In addition, incorporating features such as student worksheets (LKPD), practice questions, quizzes, games, projects, reflection activities, and explicit links to everyday-life applications is recommended to make learning more meaningful and engaging.

ACKNOWLEDGMENTS

The authors would like to express their sincere gratitude to the principals, biology teachers, and Grade XI students of SMA Negeri 1 Pekanbaru and SMA Negeri 3 Siak Hulu for their cooperation and participation in this study. Appreciation is also extended to all parties who contributed to the completion of this research during the 2025/2026 academic year.

REFERENCES

Alfira, A., & Ardi, A. (2025). Analisis konten video animasi YouTube sebagai media pembelajaran biologi pada materi sistem peredaran darah di SMA. *Jurnal Pengabdian Masyarakat dan Riset Pendidikan, 4*(2), 9541–9545.

Alonemarera, A. A., Mutmainnah, N., & Tendrita, M. (2025, November). Belajar lebih seru dengan Canva: Video interaktif untuk mengatasi kejenuhan belajar biologi siswa SMP. In *Prosiding Seminar Nasional Pembangunan Ekonomi Berkelanjutan dan Riset Ilmu Sosial* (Vol. 2, No. 1, pp. 121–134).

Ayuni, R. F. N., Wijaya, A. M. R., & Badri, M. I. (2025). Pengembangan media video animasi storytelling pada pembelajaran IPS untuk meningkatkan pemahaman siswa kelas IX. *JIIP – Jurnal Ilmiah Ilmu Pendidikan, 8*(8), 9862–9869.

Azizah, N., Handayani, B. S., Lestari, T. A., & Rasmi, A. C. (2025). Pengembangan media pembelajaran berbasis audio visual menggunakan Articulate Storyline 3 pada materi sistem peredaran darah. *Journal of Authentic Research, 4*(1), 291.

Ahmad, A. A., Ramdani, A., Andayani, Y., & Hariadi, I. (2024). Pengembangan E-Modul Ekosistem Berbasis Model Culturally Responsive Transformative Teaching dengan Pendekatan Socio-Scientific Issues Berbantuan Software 3D Pageflip Frofessional. *Journal of Classroom Action Research*, *6*(3), 673-685.

Darina, S. A., & Halidjah, S. (2025). Validitas video pembelajaran berbasis Capcut materi sistem peredaran darah manusia. *Jurnal Pengabdian Masyarakat dan Riset Pendidikan, 4*(2), 8392–8398.

Dewi, C. R. T. N., & Isdaryanti, B. (2025). Pengembangan media video animasi interaktif dengan model problem based learning untuk meningkatkan hasil belajar IPAS pada siswa kelas IV SD Negeri Tugurejo 01 Kota Semarang. *Journal of Classroom Action Research, 7*(3), 956–963.

Dewi, L. G. W. K., Warpala, I. W. S., & Adnyana, P. B. (2025). Pengembangan media video animasi interaktif berorientasi budaya lokal Bali "Tari Pendet" pada materi sistem gerak untuk siswa kelas XI. *Bioed: Jurnal Pendidikan Biologi, 13*(2), 188–199.

Vol.1, No.2 (January – 2026)
E-ISSN: 3110-1429
pp.71-79

Diniyati, A., & Mastoah, I. (2025). Peran media video animasi interaktif berbasis Canva dalam meningkatkan literasi digital siswa SD. *Didaktika Dwija Indria, 13*(2).

Faradella, B., & Ningrum, M. V. R. (2025). Bahan ajar interaktif video animasi sebagai media pembelajaran geografi materi dinamika litosfer. *Jurnal Pendidikan dan Pengajaran, 6*(3).

Fitria, A. S., Ramdani, A., & Hadiprayitno, G. (2023). Keefektifan pelaksanaan e-learning pada mata pelajaran biologi. *Journal of Classroom Action Research, 5*(1), 265–270. https://doi.org/10.29303/jcar.v5i2.2868

Handayani, T., Urva, G., Yuliati, T., Sellyana, A., & Rahmawati, A. (2025). Pengembangan video animasi 2D interaktif untuk meningkatkan pemahaman siswa SD Negeri 011 Kota Dumai tentang energi terbarukan. *Smart Dedication: Jurnal Pengabdian Masyarakat, 2*(2), 145–154.

Malau, G. S. J., Rangkuty, S. M., Silitonga, I. P. J., Tindaon, J. O. G., & Sitepu, M. O. B. (2025). Review literatur: Efektivitas penggunaan media pembelajaran video animasi dalam meningkatkan hasil belajar siswa pada materi biologi. *J-CEKI: Jurnal Cendekia Ilmiah, 4*(4), 1481–1490.

Permatasari, I., Ahmad, J., Febriyanti, F., Uno, W. D., Latjompoh, M., & Mardin, H. (2025). Pengembangan media pembelajaran berbasis video animasi pada materi klasifikasi makhluk hidup kelas X di SMA Negeri 1 Suwawa. *JUPEIS: Jurnal Pendidikan dan Ilmu Sosial, 4*(1), 16–29.

Putra, S. B., Wicaksono, S. A., & Wiratama, R. (2024). Pemanfaatan media digital interaktif dalam pembelajaran biologi untuk meningkatkan motivasi siswa. *Jurnal Cakrawala Pendidikan dan Biologi, 1*(3), 25–34.

Putri, B. P. W., Afrianti, B., Saragih, F. E., Nabilla, M., Adlini, M. N., & Rifda, R. (2023). Pengembangan media video pembelajaran pada mata pelajaran biologi dengan model ADDIE pada materi sistem pernapasan kelas 11. *Jurnal Edukasi Biologi, 9*(2).

Sari, A. P. (2025). Transformasi pembelajaran biologi: Video animasi berbasis masalah pada materi sistem gerak manusia. *Spizaetus: Jurnal Biologi dan Pendidikan Biologi, 6*(3), 457–468.

Wahyudi, I. R., Waris, W., & Fatimah, F. (2025). Efektivitas media video animasi terhadap hasil belajar biologi materi sistem pernapasan: Studi kuasi eksperimen di MA Miftahul Ulum Suren. *Jurnal Riset dan Inovasi Pembelajaran, 5*(3), 1145–1153.

Warow, S. M., Yalindua, A., & Warouw, Z. W. M. (2025). Transformasi pembelajaran biologi menggunakan video animasi: Dampaknya terhadap motivasi dan pemahaman konsep siswa pada materi klasifikasi makhluk hidup. *Jurnal Cakrawala Pendidikan dan Biologi, 2*(2), 204–217. https://doi.org/10.61132/jucapenbi.v2i2.401

Widdiyana, M., & Kristanto, A. (2024). Pengembangan media video pembelajaran materi sistem peredaran darah pada manusia mata pelajaran biologi kelas XI SMA 18 Surabaya. *Jurnal Mahasiswa Teknologi Pendidikan, 14*(2).

Yana, E., & Khairuna, K. (2024). Pengembangan media pembelajaran video animasi berbasis PjBL pada materi sistem sirkulasi darah kelas XI IPA SMA/MA. *Bioscientist: Jurnal Ilmiah Biologi, 12*(1), 1074–1089. https://doi.org/10.33394/bioscientist.v12i1.11751

Yanti, F. D. (2025). Implementasi media pembelajaran video animasi berbasis aplikasi Canva pada materi struktur dan fungsi tumbuhan pada Prodi Biologi Universitas Al Washliyah Labuhanbatu. *Jurnal Teknologi dan Manajemen Industri Terapan, 4*(2), 224–233.