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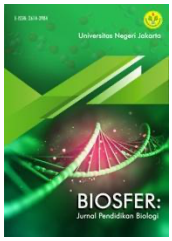

Feasibility of learning videos on nutrient subtopics

Putri Anggini, Ruqiah Ganda Putri Panjaitan*, Titin

Biology Education, Faculty of Teacher Training and Education, Tanjungpura University, Indonesia

*Corresponding author: ruqiah.gpp@fkip.untan.ac.id

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ABSTRACT

This study aims to develop and assess the feasibility of learning video media on the sub-topic of food substances based on the results of an inventory of medicinal plants that increase appetite in toddlers. The research method used is Research and Development (R&D) with reference to the Borg and Gall model which is limited to five stages, namely potential and problems, data collection, product design, design validation, and design revision. Media validation was carried out by five validators using a purposive sampling technique with assessments on aspects of format, content, language, and appearance. Validity analysis uses the Aiken's V formula, while reliability is explained using the Intraclass Correlation Coefficient (ICC) method. The results of the study showed that the learning video media obtained an overall validity value of 0.92 with a valid category. The results of the reliability test showed a value of 0.733 with a moderate category. Based on these results, the learning video media on the sub-topic of food substances is declared suitable for use as a biology learning medium, although further testing is still needed to determine its effectiveness in improving student learning outcomes.

INTRODUCTION

Technological advancement today is inseparable from human life (Alawiyah et al., 2021). Information from various parts of the world can now be accessed instantly due to technological progress (Wahyudi & Sukmasari, 2018). This advancement has occurred as a result of the inevitable development of scientific knowledge (Wulandari et al., 2023; Safira, 2023). The growth of science and technology has encouraged continuous innovation in utilizing technological outcomes for daily life (Listiana, 2021). At present, technological development has entered the digital era, and in Indonesia, nearly all sectors have begun to adopt technology to facilitate various tasks, including in the field of education (Lestari, 2018).

Education is a process of acquiring knowledge and experience through learning to support personal growth and development (Monawati & Yamin, 2016). Meanwhile, learning is an internal process that transforms various aspects of an individual's behavior, including ways of thinking, acting, and behaving (Herawati, 2020). The learning process must be supported by several factors, one of the most important being learning media, as it helps clarify the material and makes the learning process more effective compared to relying solely on the teacher's explanation (Alawiyah et al., 2021; Wulandari et al., 2023).

Learning media are tools used by teachers to serve as a bridge between the sender and receiver of information (Juhaeni et al., 2020). Learning media can stimulate thought (Ekayani, 2017), interest (Kurnia & Sunaryati, 2023), and motivation (Sya'bania et al., 2020). The use of learning media also facilitates teachers in delivering instructional material (Wahyuningtyas, 2020; Tafonao, 2018). Appropriate use of learning media can enhance the effectiveness of the learning process when it aligns with learning objectives, the content being delivered, and the characteristics of the learners (Permana et al., 2024; Lubis, 2024). Learning media are generally categorized into three types: audio media, visual media, and audiovisual media (Rahayuningsih, 2022).

One of the media that teachers can use to create an engaging and enjoyable learning atmosphere is audiovisual media (Riva & Handican, 2023). Audiovisual learning media deliver instructional content through both sound and images, thus engaging the senses of hearing and sight simultaneously (Limin & Kundiman, 2023). Types of audiovisual media include documentary films (Sofyan & Anwar, 2025), animated videos (Fauziah & Ninawati, 2022), interactive media (Riniwati et al., 2024), and instructional videos (Ekayani, 2017). Instructional video media present both audio and visual elements containing educational material to facilitate understanding through viewing and listening (Marliani, 2021). The use of instructional video media can increase students' interest in learning, as it allows them to observe and listen attentively to the material presented (Yuanta, 2020). Learning through video media can enhance students' interest and motivation to remain attentive during lessons (Marliani, 2021). Learning videos not only serve as a means of delivering material but also as a medium that can increase learning motivation and provide indirect social interaction, so that the learning process becomes more effective and meaningful (Mayer, 2021).

In addition to presenting instructional content, learning media can also be developed by integrating research findings. For instance, Paramita et al. (2018) developed a booklet based on an inventory of medicinal plants, which was implemented in teaching biodiversity material. Similarly, Lestari et al. (2023) developed video-based media applied to environmental issues, and Sofyan & Anwar (2025) produced a documentary film derived from the local wisdom of the Kajang community, which was implemented in local content subjects. However, the development of learning video media based on research results on food sub-ingredients is still limited, especially those accompanied by systematic validity and reliability testing as a basis for the feasibility of the media being developed.

One of the subtopics in biology education is nutritional substances. Currently, various media have been used to deliver this subtopic, including posters (Hudayani & Daningsih, 2017), documentary films (Magdalena et al., 2019), and instructional videos (Deriyan, 2022). However, instructional videos developed in previous studies contained only educational material and did not integrate research findings. The food substance subtopic requires contextual and visual learning media to optimally understand the concepts. Therefore, developing learning video media based on valid and reliable research findings is crucial as an alternative learning resource in schools. International research also emphasizes the importance of integrating ethnomedicinal knowledge into education. Kamble et al.

(2020) reported that incorporating information about local medicinal plants into multimedia-based learning materials increased student engagement and understanding in India.

This study introduces an innovation by developing an instructional video that integrates both topics: nutritional substances and research findings on the inventory of medicinal plants. The study is significant because many students face difficulties in understanding the subtopic of nutritional substances, and the utilization of local knowledge as a learning resource remains limited. Moreover, the preservation of traditional knowledge about medicinal plants poses a challenge in the modern era, making learning media that combine scientific and local cultural aspects highly necessary.

METHODS

Research Design

This study employed the Research and Development (R&D) method with the objective of producing instructional video media on the subtopic of nutritional substances. The development model used refers to Borg & Gall's (1984) framework, which consists of ten stages: 1) potential and problems, 2) data collection, 3) product design, 4) design validation, 5) design revision, 6) product testing, 7) product revision, 8) trial use, 9) product revision, and 10) mass production. However, this study only utilized five stages: 1) potential and problems, 2) data collection, 3) product design, 4) design validation, and 5) design revision.

Instrument

The instrument used in this study was a media validation feasibility sheet for the instructional video. The feasibility sheet was employed to assess the extent to which the developed instructional video met the eligibility criteria across various validation aspects including format, content, language, and presentation. Validators were selected using a purposive sampling technique, consisting of five validators with expertise and experience related to the development and evaluation of learning media. Validators were selected using purposive sampling and consisted of five individuals. The chosen validators were essential to ensure that the developed instructional video met scientific and educational standards. Validity is a measure that shows the level of precision of an instrument in measuring an instrument (Syaifudin, 2020), while reliability is an index that shows the extent to which a measuring instrument can be trusted and used consistently (Sugiono et al., 2020). According to Rizanti et al. (2023), the purpose of this validation is crucial for obtaining feedback and improvements to ensure the media is suitable for use in the learning process.

Procedure

The procedure in this study consisted of five stages. 1) Potential and Problems: Interviews were conducted with XI-grade biology teachers to obtain information on the use of learning media, challenges faced by teachers and students during teaching and learning activities, and research findings related to the inventory of medicinal plants. 2) Data collection by conducting interviews and observations at schools related to the use of learning media in schools, especially on the sub-material of food substances, as well as interviews with four informants about their knowledge of the use of medicinal plants to increase appetite in Peniti Besar Village. The collected data were then designed into an instructional video on the subtopic of nutritional substances. 3) Product Design: The instructional video was developed using the Canva application to incorporate elements such as animations, images, audio, and text, and CapCut was used to edit the video before integration into Canva. The video design process consisted of several steps: a) Analysis of the Learning Objective Flow (ATP) for the subtopic of nutritional substances, b) Storyboard creation, c) Script writing, consisting of an introduction, content, and conclusion. The introduction section presented the subtopic title, learning outcomes, learning objectives, and guiding questions. The content section covered material on nutritional substances, the relationship between toddlers' appetite and nutritional substances, and an introduction to plants still used by the community in Peniti Besar Village, Mempawah Regency. The conclusion expressed gratitude. d) Scenario development, and e) Completion of the instructional video. 4) Design Validation: The feasibility of the instructional video was assessed by five validators. The validation data were analyzed to determine the level of feasibility of the video. Evaluation was conducted based on four aspects: format, content, language, and presentation. The video was assessed using a Likert scale. According to Sugiyono (2019), the Likert scale was chosen for its ability to evaluate users' opinions and perceptions of the instructional video. The validation sheet scores rated by the validators included four categories: 4 (very good), 3 (good), 2 (fair), and 1 (poor). 5) Design Revision: Revisions were made based

on suggestions provided by the validators.

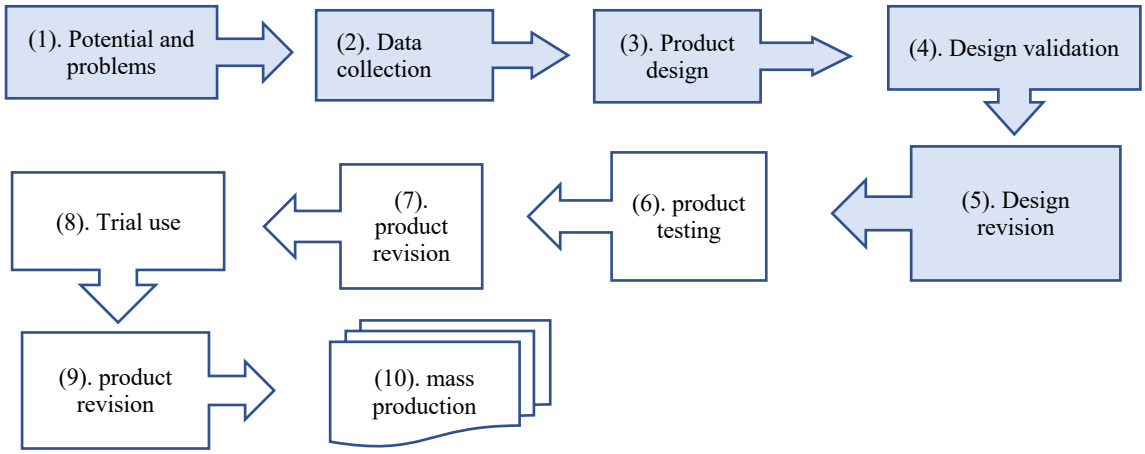

Figure 1. Research procedure

Data Analysis Techniques

The validation results of the instructional video media were analyzed using Aiken's V formula (Aiken, 1985). After calculating Aiken's V, the results were then interpreted according to the validity scale. The validity scale used refers to Apsari (2021).

The next stage involved reliability analysis to measure the level of consistency among the validators. The instrument reliability test was conducted using the Intraclass Correlation Coefficients (ICC) method, following the model described by Erma et al. (2021), namely two-way mixed effects, absolute agreement, and multiple raters/measurements. This reliability analysis was assisted using IBM SPSS Statistics 26. The criteria for the reliability coefficient based on ICC values in this study referred to Giuseppe (2018).

RESULTS AND DISCUSSION

Learning media serve as tools for delivering material so that it can be easily understood by students (Wulandari et al., 2023). The appropriate use of learning media can stimulate students' thinking, attention, and learning motivation (Juhaeni et al., 2020). In general, learning media facilitate interaction between teachers and students, making the learning process more effective and efficient (Limin & Kundiman, 2023). Instructional video media function to accelerate the achievement of learning objectives (Ekayani, 2017). This study produced an instructional video that helps students achieve learning goals, enhances learning effectiveness, and facilitates students' understanding of the subtopic of nutritional substances by integrating research findings on the inventory of medicinal plants that enhance appetite in toddlers, complemented with engaging visuals and audio to attract students' interest in the learning process.

The developed instructional video media was validated by five validators before being used in the learning process to determine its feasibility. The assessment of the instructional video media was conducted using a validation sheet focusing on four aspects: format, content, language, and presentation. The results of the analysis of the instructional video on the subtopic of nutritional substances are presented in Table 3.

Table 3.
Instructional Video Media Validation Results

Aspect	Indicator	Score	Description
Format	1. Systematic presentation	0.93	Valid
	2. Ease of understanding the overall content of the video	1.00	Valid
Content	3. Alignment of material with learning outcomes and objectives	0,87	Valid
	4. Clarity of the concepts presented	0.93	Valid

Aspect	Indicator	Score	Description
	5. Completeness of the material presented	0.87	Valid
Language	1. Conformity of grammar with the general Indonesian spelling rules	0.93	Valid
	2. Ease of understanding the sentences used	0.93	Valid
	3. Language is clear, unambiguous, and easy to understand	0.93	Valid
Presentation	1. Harmony of colors, text, and images used	0.93	Valid
	2. Clarity and attractiveness of font type and size	0.87	Valid
	3. Clarity of narration presented in the video	0.87	Valid
Overall Total		**0.92**	**Valid**

Format Aspect

The format aspect consists of two indicators: systematic presentation and ease of understanding the overall content of the instructional video. The first indicator, systematic presentation, obtained an Aiken's V validity score of 0.93, categorized as valid. Evaluations from the validators indicated that the sequence of material in the instructional video was presented clearly, structurally, and was easily understood by students. This was evidenced by the inclusion of a table of contents, which helped students comprehend the sequence and scope of the material in the subtopic of nutritional substances, starting from carbohydrates, proteins, fats, vitamins, minerals, and the relationship with appetite as well as the utilization of medicinal plants (Figure 1). The presentation of the table of contents made the learning flow more directed, allowing students to follow each part of the material systematically and easily. According to Surbakti et al. (2025), learning media should not only be visually appealing but also present material in a structured, communicative manner that aligns with the learning context. Furthermore, Paramita et al. (2018) stated that the development of instructional media should consider the completeness of content components, the sequence of material presentation, and the clarity of information conveyed. This aligns with the findings of Kaffah et al. (2023) and Riniwanti et al. (2024), which emphasize that in education, media serve as a primary tool for delivering information in a structured manner, thereby helping students understand the material more easily and clearly.

The second indicator, ease of understanding the overall content of the instructional video, obtained an Aiken's V validity score of 1.00, categorized as valid. Evaluations from the validators indicated that the material in the instructional video was presented clearly and was easy for students to understand, as the video included supporting images, such as illustrations of the nutritional substances material and classifications accompanied by photos of medicinal plants. According to Marliani (2021) and Fauziah & Ninawati (2022), instructional video media can deliver information more engagingly through the use of visuals such as images and graphics, and abstract concepts can be clearly visualized, thereby helping students understand and retain the learning material more effectively. This aligns with Rahayungsih (2022), who stated that learning media facilitates teachers in delivering material to students and helps improve students' learning abilities. Furthermore, Wahyuningtyas (2020) emphasized that learning media make it easier for students to understand the material, thereby enhancing learning outcomes.

Content Aspect

The content aspect consists of three indicators: alignment of the material presented with learning outcomes and objectives, clarity of the concepts delivered, and completeness of the material presented. The first indicator, alignment of the material with learning outcomes and objectives, obtained an Aiken's V validity score of 0.87, categorized as valid. Evaluations from the validators indicated that the material presented was consistent with the learning outcomes and objectives. However, it was deemed not optimal. To improve this, revisions were made by arranging the material in a more coherent manner, stating the learning objectives clearly at the beginning of the video, and re-emphasizing the core material that is in line with the learning outcomes so that it is easier for students to understand. According to Zulfariyanti et al. (2022), an effective instructional video is developed based on learning outcomes and objectives, ensuring that the learning process proceeds smoothly. This aligns

with Limin & Kundiman (2023), who emphasize that the selection of media in the learning process must be appropriate to optimally achieve the learning objectives in accordance with the expected final skills of students. Furthermore, Marliani (2021) and Ekayani (2017) state that audiovisual media function to accelerate the achievement of learning goals by facilitating students' understanding and retention of the messages conveyed through the video.

The second indicator, clarity of the concepts delivered, obtained an Aiken's V validity score of 0.93, categorized as valid. Evaluations from the validators indicated that the concepts presented in the instructional video were conveyed very clearly, as the material was delivered systematically and was easily understood by students. The video was supplemented with visual aids that helped clarify the meaning of each concept, ensuring that the learning messages were received clearly and effectively. According to Yuanta (2020) and Riva & Handican (2023), audiovisual media function to present information and demonstrate processes that are difficult to explain verbally. This aligns with Marliani (2021) and Sya'bania et al. (2020), who note that teachers recognize that without the support of learning media, material especially complex and challenging topics can be difficult for students to understand. Furthermore, Juhaeni et al. (2020) emphasize that instructional video media facilitate students in grasping learning information that is otherwise difficult to convey.

The third indicator, completeness of the material presented, obtained an Aiken's V validity score of 0.87, categorized as valid. Evaluations from the validators indicated that the material in the instructional video was sufficiently complete and covered all parts of the content needed to achieve the learning objectives. Each section of the material was organized sequentially and interconnected, helping students understand the lesson content more easily. However, some photos did not include sources, and the validators suggested citing the sources. This aligns with Surbakti et al. (2025) and Riniwanti et al. (2024), who note that complete and relevant material enables students to connect new knowledge with their prior knowledge, creating meaningful learning. Furthermore, Permana et al. (2024) emphasize that media play an important role in ensuring that the entire learning content is delivered systematically and completely, thereby achieving the learning objectives.

Language Aspect

The language aspect consists of three indicators: conformity of grammar with the Indonesian Spelling Guidelines (PUEBI), ease of understanding the sentences used, and clarity, unambiguity, and comprehensibility of the language. The first indicator, conformity of grammar with PUEBI, obtained an Aiken's V validity score of 0.93, categorized as valid. Evaluations from the validators indicated that the narrator's voice in the instructional video used language that adhered to PUEBI and was easily understood by students without causing confusion. According to Magdalena et al. (2019), the language used in learning media should conform to PUEBI so that students can more easily comprehend the information presented. This is in line with Paramita et al. (2019), who stated that when developing media, the use of correct and proper language in accordance with PUEBI must be considered to ensure that the content is communicated clearly. Narrator audio link: https://drive.google.com/file/d/1YHzV-SMnDuNebhB-FPUbw2E3LwObS3FX/view?usp=drivesdk.

The second indicator, ease of understanding the sentences used, obtained an Aiken's V validity score of 0.93, categorized as valid. Evaluations from the validators indicated that the vocabulary used by the narrator in the instructional video was accurate, clear, and easily understood by students. The language was simple yet effective, enabling students to grasp the material more deeply and preventing confusion during the learning process. According to Alawiyah et al. (2021), selecting appropriate, simple language that aligns with students' developmental levels is crucial because it helps students understand the material more easily and reduces the likelihood of misinterpretation. This aligns with Sofwan et al. (2024), who state that effective sentences play an important role in learning by helping students comprehend the material more easily. Successful learning depends not only on mastery of the material but also on the teacher's ability to present it in clear and understandable language. Furthermore, Hudayani & Daningsih (2017) and Erma et al. (2023) emphasize that clearly and accurately constructed sentences help readers or learners understand content quickly without confusion. Narrator audio link for the instructional video:
https://drive.google.com/file/d/1LDvlwkJagUat_ka6jricLY3uQqk65f/view?usp=drivesdk

The third indicator, clarity, unambiguity, and comprehensibility of the language, obtained an Aiken's V validity score of 0.93, categorized as valid. Evaluations from the validators indicated that the language used by the narrator in the instructional video was clear and easily understood by students.

The narrator delivered the material using well-constructed sentences without creating double meanings, ensuring that the learning messages were accurately received by the students. According to Paramita et al. (2018), the use of clear sentences that do not cause misinterpretation is crucial in developing instructional media, as well-structured sentences help students understand the material more easily and accurately. Furthermore, clarity in language can reduce misperceptions, making the learning process more effective and enabling learning objectives to be achieved optimally. This aligns with Magdalena et al. (2019) and Erma (2023), who emphasize that information presented in instructional media should use proper and correct Indonesian, making it easy for students to understand. Additionally, the language used should be neutral and non-offensive, allowing the media to be widely accepted without causing misinterpretation. Narrator audio link for the instructional video: https://drive.google.com/file/d/1oAusC8n20GM-haa5iwyGZDQoRAgBu3dN/view?usp=drivesdk

Presentation Aspect

The presentation aspect consists of three indicators: harmony of colors, text, and images; clarity and attractiveness of font type and size; and clarity of narration delivered in the instructional video. The first indicator, harmony of colors, text, and images, obtained an Aiken's V validity score of 0.93, categorized as valid. Evaluations from the validators indicated that the color combination used light yellow and light green was appropriate and contrasting, and the balance between text and image placement was well-arranged, creating a harmonious and visually appealing presentation. According to Zafitra et al. (2025), visual design should be based on instructional design principles and color theory to produce an attractive and easily understood presentation. This is also in line with Alawiyah et al. (2021) and Kurnia & Sunaryati (2023), who state that the visual design of learning media should use more than one color to make it more engaging and avoid monotony.

The second indicator, clarity and attractiveness of the font type and size, obtained an Aiken's V validity score of 0.87, categorized as valid. Evaluations from the validators indicated that the font style, type, and size were appropriate and easy to read. For example, one of the subtopic headings used the Gagalin font at 72 pt, and the main content used the Open Sans font at 52 pt. The fonts used were simple in design, and the sizes were adjusted to the media display, ensuring that the material was conveyed clearly and effectively. This aligns with Elisa et al. (2021), who stated that font types should meet four criteria: visually appealing, simple in form, easy to read, and limited in stylistic variations. Furthermore, Paramita et al. (2018) and Erma et al. (2023) emphasized that font clarity in media plays an important role in ensuring that the material's message is effectively communicated.

The third indicator, clarity of narration delivered in the instructional video, obtained an Aiken's V validity score of 0.87, categorized as valid. Evaluations from the validators indicated that the narrator's voice was clear, with engaging intonation, and the balance between narration and background music was appropriate. However, the validators suggested that in some video slides, the narration was unclear and the pacing of the narration should be adjusted. According to Pasampuri (2024), video media can support the learning process by stimulating students' thinking, emotions, and motivation through moving illustrations accompanied by narration, helping clarify the meaning of the conveyed messages. This aligns with Magdalena et al. (2019) and Erma et al. (2023), who state that in audiovisual learning media, the narrator's voice should be clear and emphasize important material. After validating the instructional video media on the subtopic of nutritional substances, a reliability test was conducted using the Intraclass Correlation Coefficients (ICC) method, following the model proposed by Erma et al. (2023). The results of the reliability analysis for the instructional video media on the subtopic of nutritional substances are presented in Table 4.

Table 4.
Reliability Analysis Results of the Instructional Video on the Subtopic of Nutritional Substances

		Lower Bound	Upper Bound	Value	df1	df2	Sig
Avarage Measures	.733[c]	.166	.968	3.750	4	40	.011

The reliability analysis of the instructional video media on the subtopic of nutritional substances yielded a score of 0.733. According to Giuseppe (2018), a reliability score ranging from 0.50 to 0.75 is considered moderate, indicating that the instrument is sufficiently reliable, though not at its maximum

potential. The inter-rater consistency that is still at a moderate level is likely caused by differences in the expertise background and point of view of the validators in interpreting the assessment indicators, especially in subjective aspects such as visual quality and narrative. Based on this, the instructional video on the subtopic of nutritional substances falls into the moderate reliability category, meaning it is considered reliable and trustworthy. Consequently, the instructional video possesses valid content validation and moderate reliability, making it suitable for use as a learning medium.

CONCLUSION

The instructional video on the subtopic of nutritional substances, based on the inventory of medicinal plants that stimulate appetite in toddlers, demonstrated validation results within the valid category and is deemed suitable for use as a learning medium. The Aiken's V validity scores were 0.97 for the format aspect, 0.89 for the content aspect, 0.93 for the language aspect, and 0.89 for the presentation aspect, all categorized as valid. The reliability analysis yielded a score of 0.733, categorized as moderate. This research produced a validated video learning medium for the food substance sub-topic, integrating knowledge of local medicinal plants as a learning resource. This medium has implications for biology teaching by supporting contextual learning and contributing to the preservation of local wisdom. However, this research is still limited to the expert validation stage, has a moderate reliability rating, and has not yet been tested for effectiveness on university students. Therefore, further research is recommended to directly test the effectiveness of the medium and develop the medium for more diverse topics and learning contexts.

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REFERENCES

Aiken L. R. (1985). Three coefficients for analyzing the reliability and validity of ratings. *Educational and Psychological Measurement,* 45, 131-142. https://doi.org/10.1177/001316448545101

Alawiyah, T., Muttaqien, M., & Hadiansah, H. (2021). Pengembangan Media Pembelajaran Berbasis Android pada Materi Sistem Imunitas. Bioeduca: *Journal of Biology Education*, 3(2), 112-123. https://doi.org/10.21580/bioeduca.v3i2.6635

Apsari, N. (2021). Instrumen Penilaian Kemampuan Literasi Sains berbasis Indigenous Knowledge pada Materi Asam Basa. *Jurnal Pembelajaran IPA dan Aplikasinya* (QUANTUM), 1(2), 60-66. https://doi.org/10.46368/qjpia.v1i2.500

Borg, W. R., & Gall, M. D. (1984). Educational research: An introduction. *British Journal of Educational Studies*, 32(3). https://doi.org/10.2307/3121583

Deriyan, L. F. (2022). Pengembangan media video pembelajaran IPA dengan menggunakan aplikasi Capcut di Kelas V SD. *Jurnal Penelitian Pendidikan MIPA*, 7(1), 1-10. https://doi.org/10.32696/jp2mipa.v7i1.1332

Ekayani, P. (2017). Pentingnya penggunaan media pembelajaran untuk meningkatkan prestasi belajar siswa. *Jurnal Fakultas Ilmu Pendidikan Universitas Pendidikan Ganesha Singaraja*, 2(1), 1-11.

Elisa, E., Panjaitan, R. G. P., & Wahyuni, E. S. (2021). Pembuatan buku saku submateri pemanfaatan keanekaragaman hayati Indonesia kelas X SMA. *Jurnal Pendidikan Informatika dan Sains*, 10(2), 90-98. https://doi.org/10.31571/saintek.v10i2.2396

Erma, E., Yeni, L. F., & Wahyuni, E. S. (2023). Pengembangan Media Video Tutorial Uji Antibakteri pada Submateri Peranan Bakteri X SMA: (The Development of Tutorial Test of Antibacteril Media on Submaterial Role Bacterial Submaterials for Tent-Grade Students of Senior High School). *BIODIK*, 9(3), 102-112. https://doi.org/10.22437/biodik.v9i3.24581

Fauziah, M. P., & Ninawati, M. (2022). Pengembangan media audio visual (video) animasi berbasis Doratoon materi hak dan kewajiban penggunaan sumber energi mata pelajaran PPKn di sekolah dasar. *Jurnal Basicedu*, 6(4), 6505-6513. https://doi.org/10.31004/basicedu.v6i4.3257

Giuseppe, P. (2018). StaTips Part V: The adjustment of the P value in the context of multiple comparisons. South European *Journal of Orthodontics and Dentofacial Research*, 5(2). https://doi.org/10.5937/sejodr5-19643

Herawati, H. (2020). Memahami proses belajar anak. Bunayya: *Jurnal Pendidikan Anak*, 4(1), 27-48. https://doi.org/10.22373/bunayya.v4i1.4515
Hudayani, A., & Daningsih, E. (2017). Kelayakan Media Pembelajaran Poster Kandungan Gizi Buah Alpukat dan Buah Naga pada Sub Materi Zat Makanan. *Jurnal Pendidikan dan Pembelajaran Khatulistiwa* (JPPK), 6(4). https://doi.org/10.26418/jppk.v6i4.19760
Juhaeni, S., Nurhayati, R., & Tanzila, A. N. (2020). Konsep dasar media pembelajaran. *JIEES: Journal of Islamic Education at Elementary School*, 1(1), 34-43. https://doi.org/10.55606/jsr.v1i1.993
Kaffah, L. S., Setiawan, D., & Waluyo, E. (2023). Pemanfaatan Media Cetak Poster Dalam Pembelajaran Bahasa Indonesia Dengan Menggunakan Aplikasi Canva Di Kelas V Sd. *Jurnal Ilmiah Wahana Pendidikan,* 9(16), 482-492. https://doi.org/10.5281/zenodo.8246435
Kamble, S. P., Ghadyale, V, A., Patil, R. S., Haldavnekar, V. S., & Arvindekar, A. U. (2020). Inhibition of GLUT transporter by geraniol from Cymbopogon martinii: a novel treatment for diabetes mellitus in streptozotocin-induced diabetic rats. *Journal of Pharmacy and Pharmacology*, *72*(2), 94–304. https://doi.org/10.1111/jphp.13194
Kurnia, I. R., & Sunaryati, T. (2023). Media pembelajaran video berbasis aplikasi Canva untuk meningkatkan minat belajar siswa. *Jurnal Educatio Fkip Unma*, 9(3), 1357-1363. https://doi.org/10.31949/educatio.v9i3.5579
Lestari, R., Jasiah, J., Rizal, S. U., & Syar, N. I. (2023). Pengembangan Media Berbasis Video pada Pembelajaran IPAS Materi Permasalahan Lingkungan di Kelas V SD. *Jurnal Holistika*, 7(1), 34-43. https://doi.org/10.24853/holistika.7.1.34-43
Lestari, S. (2018). Peran teknologi dalam pendidikan di era globalisasi. EDURELIGIA: *Jurnal pendidikan agama Islam*, 2(2), 94-100. https://doi.org/10.33650/edureligia.v2i2.459
Limin, S., & Kundiman, R. S. (2023). Peranan Media Pembelajaran Berbasis Audio Visual Dalam Menunjang Minat Belajar Mahasiswa Pada Mata Kuliah Sejarah Musik. Psalmoz: A Journal of Creative and Study of Church Music, 4(1), 16-26. https://doi.org/10.51667/jpsalmoz.v4i1.1114
Listiana, Y. R. (2021). Dampak globalisasi terhadap karakter peserta didik dan kualitas pendidikan di Indonesia. *Jurnal Pendidikan Tambusai*, 5(1), 1544-1550. https://jptam.org/index.php/jptam/article/view/1134
Lubis, K. M. (2024). Pengembangan dan Aplikasi Media Pembelajaran: Meningkatkan Efektivitas Proses Pembelajaran. *Jurnal Pendidikan Islam*, 3(1), 95-103. https://doi.org/10.59342/jgt.v3i1.349
Magdalena, M., Candramila, W., & Marlina, R. (2019). Kelayakan media film dokumenter perilaku makan dalam submateri zat makanan kelas XI SMA. *Jurnal Pendidikan dan Pembelajaran Khatulistiwa* (JPPK), 8(10). https://doi.org/10.26418/jppk.v8i11.37116
Marliani, L. P. (2021). Pengembangan video pembelajaran untuk meningkatkan motivasi belajar siswa sekolah dasar. Paedagogy: *Jurnal Ilmu Pendidikan Dan Psikologi*, 1(2), 125-133. https://doi.org/10.51878/paedagogy.v1i2.802
Mayer, R. E. (2021). Evidence-based principles for how to design effective instructional videos. *Journal of Applied Research in Memory and Cognition*, 10, 229–240. https://doi.org/10.1016/j.jarmac.2021.03.007
Paramita, R., Panjaitan, R. G. P., & Ariyati, E. (2018). Pengembangan booklet hasil inventarisasi tumbuhan obat sebagai media pembelajaran pada materi manfaat keanekaragaman hayati. *Jurnal Ipa & Pembelajaran Ipa*, 2(2), 83-88. https://doi.org/10.24815/jipi.v2i2.12389
Pasampuri, T. (2024). Pengenalan Media Pembelajaran Berbasis Video Animasi untuk Meningkatkan Motivasi belajar Siswa di SDN 110 Lura. *Journal Scientific of Mandalika* (JSM) e-ISSN 2745-5955| p-ISSN 2809-0543, 5(12), 496-501. https://doi.org/10.36312/10.36312/vol5iss12pp496-501
Permana, B. S., Hazizah, L. A., & Herlambang, Y. T. (2024). Teknologi pendidikan: efektivitas penggunaan media pembelajaran berbasis teknologi di era digitalisasi. Khatulistiwa: *Jurnal Pendidikan Dan Sosial Humaniora,* 4(1), 19-28. https://doi.org/10.55606/khatulistiwa.v4i1.2702
Rahayuningsih, P. (2022). Fungsi dan peran media pembelajaran sebagai upaya peningkatan kemampuan belajar siswa. JPIB: *Jurnal Penelitian Ibnu Rusyd*, 1(1). https://ojs.staiibnurusyd.ac.id/index.php/jpib/article/view/101
Riniwanti, R., Nursalam, N., & Arifin, J. (2024). Pengembangan media audio visual interaktif berbasis kinemaster dalam pembelajaran IPS pada peserta didik kelas V UPTD SDN 14 Samanggi kabupaten Maros. *Jurnal Pendidikan dan Pembelajaran Indonesia* (JPPI), 4(1), 263-277. https://doi.org/10.53299/jppi.v4i1.477

Riva, S., & Handican, R. (2023). Persepsi siswa terhadap penggunaan media audio-visual pada pembelajaran matematika. *Griya Journal of Mathematics Education and Application*, 3(2), 372-383. https://doi.org/10.29303/griya.v3i2.335

Rizanti, W. N., & Jufri, A. W. (2023). Peningkatan pendidikan karakter peserta didik melalui bahan ajar IPA berbantuan media game. *Journal of Classroom Action Research*, 5(1), 114-120. https://doi.org/10.29303/jcar.v511.2931

Safitri, A. O., Handayani, P. A., & Herlambang, Y. T. (2023). Manusia dan teknologi: Studi filsafat tentang peran teknologi dalam kehidupan sosial. *Jurnal Pendidikan Sosial Dan Humaniora*, 2(4), 13157-12171. https://publisherqu.com/index.php/pediaqu/article/view/753

Sofwan, M. Z., Farida, F., Arroyo, M., Junianti, A. D., & Andrean, M. R. (2024). Optimalisasi Penggunaan Kalimat Efektif Untuk Meningkatkan Komunikasi Yang Jelas. *Jurnal Intelek Insan Cendikia*, 1(10), 6799-6808.

Sofyan, F. F., & Anwar, C. R. (2025). Pengembangan Film Dokumenter Suku Kajang Sebagai Media Pembelajaran Kearifan Lokal Mata Pelajaran Muatan Lokal Kelas X Sma Negeri 10 Bulukumba. *Jurnal Ilmiah Pendidikan Dasar*, 10(1), http://eprints.unm.ac.id/id/eprint/36727

Sugiono, S., Noerdjanah, N., & Wahyu, A. (2020). Uji validitas dan reliabilitas alat ukur SG posture evaluation. *Jurnal Keterapian Fisik*, 5(1), 55-61. https://doi.org/10.37341/jkf.v5i1.167

Sugiyono. (2021). Metode Penelitian Kuantitatif Kualitatif dan R&D. Bandung: Alfabeta.

Surbakti, E. M. B., Ginting, I. T. B., Sihite, L. S., Sigiro, Y., & Yuni, R. (2025). Respon Siswa Terhadap Efektivitas Media Pembelajaran Video Dalam Meningkatkan Pemahaman Materi Lembaga Keuangan. *Jurnal Multidisiplin Ilmu Akademik*, 2(3), 324-332. https://doi.org/10.61722/jmia.v2i3.4787

Sya'bania, N., Anwar, M., & Wijaya, M. (2020). Pengembangan Media Pembelajaran Berbasis Video Animasi dengan Model Pembelajaran Inkuiri Terbimbing untuk Meningkatkan Motivasi dan Hasil Belajar Peserta Didik. *Chemistry Education Review* (CER), 4(2), 34-44. https://doi.org/10.26858/cer.v4i2.19117

Syaifudin, S. (2020). Validitas dan Reliabilitas Instrumen Penilaian Pada Mata Pelajaran Bahasa Arab. *Cross-border*, 3(2), 106-118.

Tafonao, T. (2018). Peranan Media Pembelajaran dalam Meningkatkan Minat Belajar Peserta didik. *Jurnal Komunikasi Pendidikan*, 2(2), 103–114. https://doi.org/10.32585/jkp.v2i2.113

Wahyudi, H. S., & Sukmasari, M. P. (2018). Teknologi dan kehidupan masyarakat. *Jurnal Analisa Sosiologi,* 3(1), 13-24. https://media.neliti.com/media/publications/227634-teknologi-dan-kehidupan-masyarakat-7686df94.pdf

Wahyuningtyas, R., & Sulasmono, B. (2020) Pentingnya Media Dalam Pembelajaran Guna Meningkatkan Hasil Belajar Di Sekolah Dasar. Edukatif: *Jurnal Ilmu Pendidikan*, 2(1), 23-27. https://doi.org/10.31004/edukatif.v2i1.77

Wulandari, A. P., Salsabila, A. A., Cahyani, K., Nurazizah, T. S., & Ulfiah, Z. (2023). Pentingnya media pembelajaran dalam proses belajar mengajar. *Journal on Education*, 5(2), 3928-3936. https://doi.org/10.31004/joe.v5i2.1074

Yamin, M. M. (2016). Upaya Meningkatkan Hasil Belajar Siswa Melalui Lesson Study pada Penjumlahan Pecahan Di Kelas IV Sdn Lamsayeun. *Jurnal Pesona Dasar Universitassyiah Kuala*, 3(4).

Yuanta, F. (2020). Pengembangan media video pembelajaran ilmu pengetahuan sosial pada siswa sekolah dasar. Trapsila: *Jurnal Pendidikan Dasar*, 1(02), 91-100.: http://dx.doi.org/10.30742/tpd.v1i02.816

Zafitra, F., Modeong, M., & Sumual, H. (2025). Pengembangan Media Pembelajaran Interaktif Berbasis Website pada Mata Pelajaran Jaringan Komputer di Kelas X SMK Negeri 1 Tomohon. Edutik: *Jurnal Pendidikan Teknologi Informasi dan Komunikasi*, 5(5), 1637-1649. https://calamus.id/index.php/edutik/article/view/127/132