JPPIPA 9(8) (2023)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

http://jppipa.unram.ac.id/index.php/jppipa/index

Feasibility of Butterfly Pea Plant Plant *Booklet* (*Clitoria ternatea* L.) as Learning Media

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Received: May 29, 2023
Revised: August 5, 2023
Accepted: August 25, 2023
Published: August 31, 2023

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DOI: 10.29303/jppipa.v9i8.4058

Abstract: Learning media is a tool that teachers can use to improve the quality of learning. Making learning media can be compiled based on the results of previous research literature studies on an object. The purpose of this study was to determine the feasibility of learning media for *Clitoria ternatea* L. booklets. The stages in this research are carried out by collecting information through literature studies related to falconry plants, booklet preparation, booklet validation, and booklet revision based on suggestions from both validators. Booklet assessment covers aspects of format, content, and language. The results of validation by validators are then analyzed using Gregory. The results of the data that have been analyzed show that aspects of format, content, and language get a value of 1.00 and these three aspects have an average of 1.00 with a very high validity category. Thus, it can be concluded that this eagle plant booklet is suitable to be used as a learning medium.

Keywords: Booklet; Feasibility; Learning Media

Introduction

Education in the 21st century emphasizes on proving the quality of learning. The quality of learning in schools is currently determined by learning designed and implemented by teachers, such as various learning strategies, learning models, learning media management, and teaching materials made (Mahardika et al., 2021; Ajjawi et al., 2019; Muchlisianah & Umam, 2022; Zakiah et al., 2019; Munisah, 2020; Purnasari & Sadewo, 2020). Innovation to improve the quality of learning which is very important is through appropriate, quality, creative and interesting learning media, so that it can help and facilitate teachers and students in achieving optimal learning goals (Wulandari et al., 2020; Nevrita et al., 2020; Panjaitan et al., 2021). Furthermore, the media used can make students more interested in learning and hone their knowledge in an effort to achieve learning goals, so that the media as a system absolutely must exist to be used in every lesson (Magdalena et al., 2021; Batubara et al., 2021).

Learning media is part of the learning system in the form of objects and environments that can act as educational tools to assist teaching and learning activities and foster student learning motivation (Suryani & Ardianto, 2019; Moto, 2019), as well as an intermediary from the teacher to students so that they can change students' thinking about a material from abstract to concrete (Anjarwati et al., 2022; Khamidah et al., 2019). Learning media must be selected and adjusted in advance to the needs in order to solve learning problems (Panjaitan et al., 2021). Learning media is very diverse in its form, including audio (contains auditive messages so that it relies on the sense of hearing only) (Asmi, 2019; Swastyastu, 2020), audio visual (a combination of audio and visual media) (Pradilasari et al., 2019; Alfiltani, 2022; Swastyastu, 2020), and visual (rely on the sense of sight) (Suryana et al., 2022; Aspahani et al., 2020; Swastyastu, 2020; *Habibati et al.*,

How to Cite:
Panjaitan, R.G.P., Tenriawaru, A.B., Hayati, N., Minderman, N.N., & Murni, O.P. (2023). Feasibility of Butterfly Pea Plant Plant Booklet (Clitoria ternatea L.) as Learning Media. *Jurnal Penelitian Pendidikan IPA*, *9*(8), 6520–6530. https://doi.org/10.29303/jppipa.v9i8.4058

2019). According to Yeni et al. (2020); Layal et al. (2022) visual media is suitable for use and used as a reference in carrying out learning. Visual media is media that is presented through the main elements in the form of lines, shapes, colors and textures, and in its use this media only relies on the students' sense of sight (Dewi et al., 2019). Furthermore, visual media consists of several types, namely print-verbal media, graphic print media, and non-print visual media (Purwasih, 2023). In accordance with Amri (2021) Print media is visual media that is made by printing and printing or offset. In print media messages are presented in the form of letters and pictures to further clarify the message or information presented.

Nowadays, technology-based learning media is very booming and very popular. Tsekeris (2019); Bi & Shi (2019); Mandasari & Aminatun (2022) in their research revealed education in the 21st century which is closely related to technology is now very booming its use in supporting learning activities, so it is very popular in education circles. However, print media is also still used, because it still has advantages that can be maintained or even improved. The advantages of print media, namely the presentation of information or messages in large quantities, information or messages can be studied based on the needs, interests, and speed of each student, easy to carry so that they can be studied anytime and anywhere, and interesting when equipped with pictures and colors (Laranti et al., 2023).

Booklet is a print media that has many advantages. Booklet is one of the print media that comes from a combination of books and leaflets in which there is a concise and illustrated message or information so that it can attract students' interest to read it (Romika et al., 2022). Based on Dewi et al., (2020); Apriyeni & Gusti (2021) booklets are smaller in size than books and only consist of 5-48 pages. In general, based on research results, booklets can increase knowledge (Fitriani & Krisnawati, 2019; Yuliana et al., 2019), improving the results of study (Rani et al., 2020), improving the interests and students motivation in study (Syamsurizal & Ardianti, 2021; Muslimah et al., 2023), and as mass communication media (Itsna et al., 2022). As for universities, booklets can be used to better understand the concepts of the material taught and systematically allow students to learn to master various kinds of competencies that are required to the maximum (Harlis et al., 2021). Booklet as one of the print media used by teachers in learning should be made by teachers, because teachers are the spearheads of determining learning success so they must be able to design, manage, implement, and evaluate learning (Putri, et al., 2021; Susanah, et al., 2020; Wahid, 2018). From the description above, in this study a booklet of butterfly bean plant (*Clitoria ternatea* L.) was developed in learning Traditional Phytochemistry so that students have a new understanding and knowledge of butterfly bean plants both in terms of morphology to useful content in it. The butterfly pea plant is a type of plant that is used by the people of Indonesia and even in the world as medicine, ornamental plants, dyes, as food, and cosmetics. (Purba, 2020; Rahmadani et al., 2022; Pratimasari & Lindawati, 2018; Sumartini, 2020; Putri & Baharza, 2023; Rosidah et al., 2023; Taufik & Ainiyah, 2021; Izzulhaq et al., 2022; Rezaldi et al., 2022; Abdilah et al., 2022).

Method

This research is a study that uses the development method or R&D (Research and Development). Development in this study was carried out by collecting information through literature studies related to butterfly pea plants, compiling booklets, validating booklets, and revising booklets based on suggestions from the two validators. The literature study stage is the initial stage carried out to find information about the general description of the butterfly pea plant and the utilization of the butterfly pea plant by the people of Indonesia and even other countries. The preparation of this booklet refers to Panjaitan & Tenriawaru (2022), namely determining the title of the booklet and arranging the components in the booklet such as editing margins, letters, images, and colors. After preparing the booklet, the next step is booklet validation. Aspects assessed in the validation test are aspects of format, content, and language. An assessment of the eligibility of the booklet is carried out by the validator according to their expertise in biology or biology learning. The final stage is to analyze the validation data by the two validators referring to Gregory (2013) and the validation criteria referring to Amir et al. (2015).

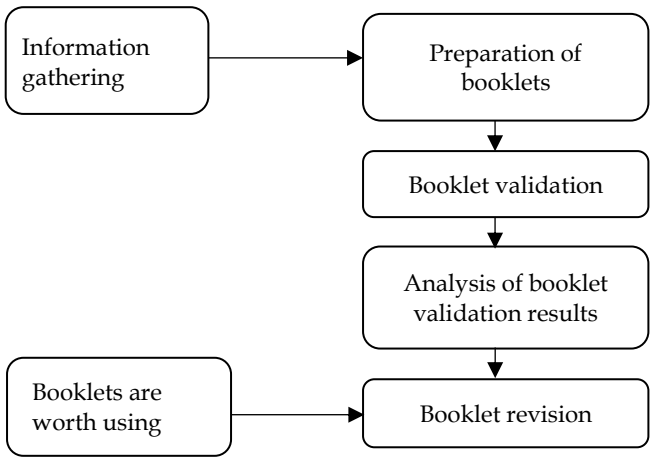

Figure 1. Research flow

Result and Discussion

The results of the information in the research obtained through literature study activities are compiled and presented in booklets as a form of learning media. Paper as the material used in the preparation of this butterfly pea booklet is 14.8 x 21 cm (A5) in size which was made using Microsoft Word 2016. The results of the booklet validation analysis carried out by two validators are presented in Table 1.

The results of the analysis obtained from the validator's assessment on the aspects of format, content, and language with a total of 10 criteria obtained a validation value of 1.00 which means it has a very high validity category. The overall average regarding the assessment according to these criteria obtained a value of 1.00 with a very high validity category.

Table 1. The Validator's Assessment of The Developed Booklet Media

Aspects	Criteria	Validator 1	Validator 2	Validity	Annotation
Format	Booklet media cover design	3	4	1,00	Validity Very High
	The practicality of booklet media is brought	4	4		
	The suitability of the type and size of the letters used	4	4		
	Media booklets are arranged systematically	4	4		
	Layout of the contents of the booklet	3	4		
Content	Appropriateness of plant names, pictures, and descriptions of medicinal plants	4	4	1,00	Validity Very High
	The connection between the information presented in the booklet and its suitability with the student's level of academic ability	4	4		
	Complete pictures and information presented in the booklet	4	4		
Language	The use of language that is simple and easy to understand	4	4	1,00	Validity Very High
	The use of language and sentences in the booklet is in accordance with the General Guidelines for Indonesian Spelling (PUEBI)	4	3		
			Average	1,00	Validity Very High

Aspect of Format

The format aspect in this study obtained a value of 1.00 with a very high validity category. This is in line with the results of research by Panjaitan, Titin, & Wahyuni (2020), that the aspect of the booklet format developed is valid with a value of 1.00 (very high validity). The criteria for this format aspect consist of five, namely the cover design of the booklet media, the practicality of the booklet media being carried, the suitability of the type and size of the letters used, the booklet media are arranged systematically, and the layout of the booklet contents. The criteria for the format aspect in the assessment of booklets are based on the results of previous studies, which include the cover design of the booklet media, the practicality of the booklet media, the suitability of the type and size of the letters used, the booklet media are arranged systematically, and the layout of the booklet contents (Panjaitan & Tenriawaru, 2022). The first criterion is the cover design of the booklet media, which has a value of 1.00 in the very high validity category. This means that the cover design of this booklet media meets color suitability, represents the contents of the booklet, displays clear and attractive images (Figure 2).

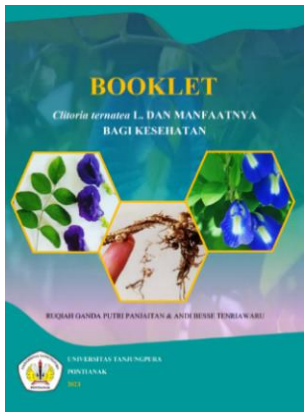

Figure 2. Booklet Cover Design (In Bahasa)

As stated by Muswita et al. (2020) the harmony between the combination of colors, letters, and images on the cover can provide an illustration or description of the content so that it can attract readers' interest.

The second criterion is the practicality of the booklet media which is brought to a score of 1.00 with a very high validity category. This shows that the booklet media that has been made meets practical indicators, namely easy to store, easy to carry, and easy to use. As revealed by Agustin, Asrizal, & Festiyed (2021); Babinčáková & Bernard (2020); Nurdiyanti, Wadji, & Fadhilah (2022) that media practicality is a criterion that shows the ease of use so that it can create quality learning and can broaden students' insights. The third criterion is the suitability of the type and size of the letters used to obtain a value of 1.00 with a very high validity category. The booklets in this study were written consistently, meaning that the type and size of the letters used were the same on each page (Figure 3). The typeface used in the booklet media is Times New Roman and the size used is for message or information exposure size 12 and for image descriptions size 11, spacing 1.5, top and left margins measuring 2 cm, bottom and right margins measuring 1 cm, and the paper used is 14.8 x 21 cm (A5) and the materials used are glossy paper for the cover and HVS for the contents of the booklet. This, as a whole, is stated to be in accordance with the media booklet. As stated by Nuraini & Waluyo (2021) that the use of letters in an appropriate and appropriate manner can influence the reader regarding the readability of the message conveyed. In addition, the readability of writing is also affected by spacing (Mustari et al., 2020). The fourth criterion is related to the systematic preparation of booklets. The validation results by the validator are 1.00 with a very high validity category. This booklet media is structured by containing three parts, namely the opening, main, and closing. In the opening part of the booklet media includes the cover, preface, and table of contents; the core part includes an overview of the butterfly pea plant and the utilization of the telan plant, summary, formative tests and answer keys; and the closing section includes a bibliography, glossary, and index (Figure 4). As stated by Panjaitan et al. (2021) that the components in the booklet should be arranged systematically so that it makes it easier for the reader to build his thinking power when reading the booklet. The fifth criterion is the layout of the contents of the booklet. An assessment of this criterion obtained a value of 1.00 with a very high validity category, which means that the contents of the booklet have fulfilled the proportional component of placement, are neat, and are easy to understand. The contents of this booklet media contain a general description of the butterfly pea plant and its use.

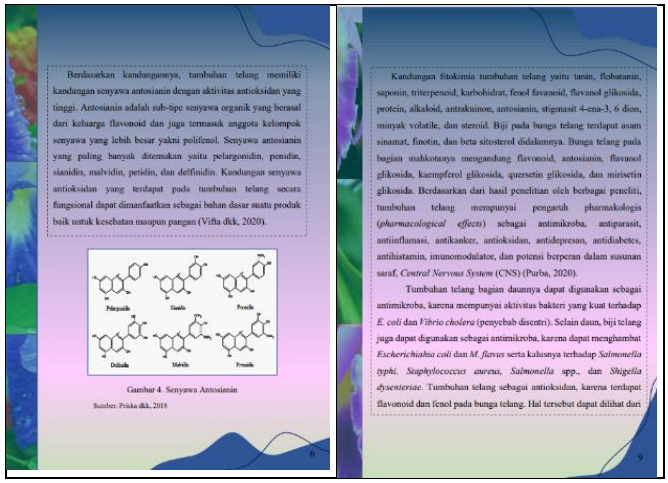

Figure 3. The Use of Alphabet In Booklet (In Bahasa)

Figure 4. Parts of booklet (in bahasa)

Aspect of Content

The content aspect in this study obtained a value of 1.00 with a very high validity category. This is in line with the results of research by Panjaitan, Titin, & Wahyuni (2020), that the content aspect of the developed booklet is valid with a value of 1.00 (very high validity). In this content aspect, there are three criteria, namely the suitability of plant names, pictures, and descriptions of medicinal plants, the relationship between the information presented in the booklet and its suitability with the student's level of academic ability, and the completeness of the pictures and information presented in the booklet. The first criterion is the conformity of plant names, pictures, and descriptions of medicinal plants with a value of 1.00 in the very high validity category. This shows that the media booklet has presented the name, picture and description of the butterfly pea plant appropriately (Figure 5). Regarding the suitability of text and images in booklets, Oktaviani et al. (2021) stated that the suitability between text and images can trigger user interest in reading the information presented in the booklet. The second criterion is the relationship between the information presented in the booklet and its suitability with the level of students' academic ability, which scores 1.00 in the very high validity category. This shows that booklet media are interrelated, easy to understand, and in accordance with the level of student academic ability. As stated by Hanisah et al. (2022); Dani, (2023) that information conveyed that is relevant to academic abilities can build the integrity of students' thinking concepts. The third criterion is the completeness of the pictures and information presented in the booklet, which scores 1.00 in the very high validity category. In this booklet, an overview section of the butterfly pea plant is presented with pictures so that booklet users know the shape and characteristics of the butterfly pea plant. In addition, for each discussion regarding the use of butterfly pea plants, pictures are presented to support the elaboration of the description (Figure 6). Based on the assessment by the validator, the colors in the images in this booklet need to be contrasted and sharpened. In line with this, Andriyani & Suniasih (2021) revealed that learning media that is equipped with pictures and presented in an attractive way can make it easier for users to remember the messages conveyed. In addition, images can also clarify abstract material so that it can help readers understand the material (Winarto et al., 2020; Jeong & So, 2020).

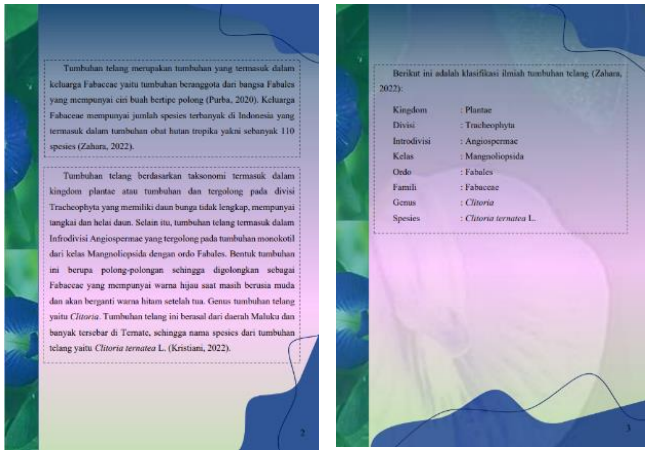

Figure 5. Presentetation of Butterfly Plant Information (In Bahasa)

Butterfly pea plant plant is one of the plants widely used by the community. Its uses are quite diverse, including food coloring, textile coloring, medicine, ornamental plants, cosmetics, and vegetables.

As revealed by Gamage, Lim, & Choo (2021) that this plant is used as animal feed, environmentally friendly insecticides, nitrogen-fixing plants, food coloring, ornamental plants, as a food and dessert drink, and as a vegetable in Southeast Asia. In addition, this plant is also used in traditional medicine, such as treating anasarca disorders, ascites, liver disorders, hemicrania, irritation of the urethra and bladder, and enlargement of the stomach viscera. The medicinal properties of this plant have been tested for validity, namely having antioxidant, antidiabetic, and hepatoprotective activities (Lakshan et al., 2019). The phytochemical content found in butterfly pea plants is very diverse, including tannins, flobatanins, saponins, triterpenoids, carbohydrates, phenolic favanoids, flavanol glycosides, proteins, alkaloids, anthraquinones, anthocyanins, stigmasite 4-ene-3, 6 diones, volatile oils, and steroids. The seeds of the butterfly pea plant contain cinnamic acid, finotin, cyclotide, and beta sitosterol so that they are efficacious as antimicrobials. Furthermore, the flowers of the butterfly pea plant contain flavonoids, anthocyanins, flavanol glycosides, kaempferol glycosides, quercetin glycosides, cyclotides, and myricetin glycosides so that the flower parts are useful as anticancer and antimicrobial agents. The leaves of the butterfly pea plant also contain chemical compounds, namely cyclotides, flavonoids, polyphenols, terpenoids, saponins, and quinones so that they have antimicrobial, anti-inflammatory, antidiabetic, and antirheumatic properties. The stem of the butterfly pea plant contains cyclotide so that it can act as an antimicrobial. The roots of the butterfly pea plant contain saponins, alkaloids, flavonoids, fatty acids, delfinidin 3,3',5' triglucosides, phenols, cyclotides, and betasitosterol so that they can be efficacious as antidepressants and antimicrobials (Purba, 2020; Refwalu et al., 2023; Abriyani, 2023; Yazhini et al., 2023).

(a) Picture Display On Booklet Before Revision (In Bahasa) (b) Picture Display On Booklet After Revision (In Bahasa)

Figure 6. Picture Display On Booklet (In Bahasa)

Aspect of Language

The language aspect in this study obtained a score of 1.00 with a very high validity category. This is in line with the results of research by Panjaitan, Titin, & Wahyuni (2020), that the language aspect of the developed booklet is valid with a value of 1.00 (very high validity).In this aspect of language, there are two criteria, namely the use of language that is simple and easy to understand, and the use of language and sentences in the booklet in accordance with the General Guidelines for Indonesian Spelling (PUEBI). The first criterion regarding the use of language that is simple and easy to understand and the use of language obtains a value of 1.00 with a very high validity category. This shows that the booklet media in this study does not lead to multiple interpretations, is straightforward, communicative, and understandable (Figure 7).

Figure 7. Language display on *booklet* (in bahasa)

Panjaitan et al. (2021); Nuraini & Waluyo (2021) revealed that suitability in the use of language in booklet media can help readers to understand the intent of the contents of the booklet and help learn the information that has been presented so that it does not cause double interpretations. The second criterion, namely regarding the use of language and sentences in the booklet in accordance with the General Guidelines for Indonesian Spelling (PUEBI), obtained a value of 1.00 with a very high validity category. As stated by Sari & Setiawan, (2018); Linda et al. (2021) that the suitability of sentences with rules really needs attention, because it can affect the use of the right word so that this makes it easier for the reader to understand the content of the material.

Conclusion

The booklet which contains an overview of the butterfly pea plant and the utilization of the butterfly pea plant can be used as a student learning medium with an average validity value for each aspect of format, content, and language of 1.00 (very high validity category).

Acknowledgments
This research was conducted using funds from the 2023 DIPA of the Teaching and Education Faculty of Tanjungpura University. Thus, we would like to thank the faculty leaders, in addition to thanking the validators who have provided assessments and suggestions.

Author Contributions
Drafting proposal, Ruqiah Ganda Putri Panjaitan, Andi Besse Tenriawaru, Nurul Hayati, and Nasreen Nischka Minderman; preparation of booklets, Ruqiah Ganda Putri Panjaitan, Andi Besse Tenriawaru, and Odela Priscilia Murni; data analysis, Ruqiah Ganda Putri Panjaitan, Andi Besse Tenriawaru, Nasreen Nischka Minderman, and Odela Priscilia Murni; validation, Nasreen Nischka Minderman; literature search, Nurul Hayati; article preparation, Ruqiah Ganda Putri Panjaitan, Andi Besse Tenriawaru, Nurul Hayati, and Nasreen Nischka Minderman.

Funding
This research was funded by the 2023 DIPA of the Teaching and Education Faculty of Tanjungpura University.

Conflicts of Interest
The authors declare no conflict of interest.

References

Abdilah, N.A., Rezaldi, F., Fadillah, M.F., Setiawan, U., Oktavia, S., Meliyawati, M., & Pertiwi, F.D. (2022). Pelatihan pembuatan sabun cuci tangan probiotik fermentasi kombucha bunga butterfly pea plant kepada mahasiswa farmasi semester 5 Universitas Mathla'ul Anwar Banten sebagai peningkatan wawasan dalam mata kuliah bioteknologi. *Jurnal Pengabdian kepada Masyarakat Indonesia*, *2*(1), 21-28. https://doi.org/10.55606/jpkmi.v2i1.118

Abriyani, E. (2022). Skrining fitokimia ekstrak daun bunga butterfly pea plant (*Clitoria ternatea* L.) dan uji toksisitas terhadap larva udang *Artemia salina* dengan metode bslt. *Journal of Pharmacopolium*, *5*(2), 220-222. http://dx.doi.org/10.36465/jop.v5i2.902

Agustin, S., Asrizal, A., & Festiyed, F. (2021). Analisis effect size pengaruh bahan ajar IPA bermuatan literasi sains terhadap hasil belajar siswa SMP/MTs. *Jurnal IPA & Pembelajaran IPA*, *5*(2), 125-137. https://doi.org/10.24815/jipi.v5i2.19606

Ajjawi, R., Tai, J., Nghia, T.L.H., Boud, D., Johnson, L., & Patrick, C.J. (2019). Aligning assessment with the needs of work-integrated learning: the challenges of authentic assessment in a complex contex. *Assessment and Evaluation in Higher Education*, *45*(2), 304-316. https://doi.org/10.1080/02602938.2019.1639613

Alfitani, M.S. (2022). Disain media pembelajaran berbasis audio visual pada materi sistem jaringan tumbuhan untuk meningkatkan keterampilan sains pada peserta didik di MA NW Aik Ampat. *Jurnal Pengabdian Magister Pendidikan IPA*, *5*(2), 144-148. https://doi.org/10.29303/jpmpi.v5i2.1593

Amir, M., Muris, & Arsyad, M. (2015). Pengembangan perangkat pembelajaran berbasis pengalaman pada peserta didik kelas XI IPA SMA Negeri 9 Pinrang. *Jurnal Sains dan Pendidikan Fisika, 11*(3), 202–213. https://doi.org/10.35580/jspf.v11i3.1756

Amri, A.F. (2021). Penerapan media audio-visual dalam pembelajaran sains untuk meningkatkan hasil belajar siswa. *Jurnal Riset Pendidikan Indonesia*, *1*(1), 29-38. Retrieved from https://ojs.unsiq.ac.id/index.php/jrpi/article/view/2395

Andriyani, N.L., & Suniasih, N.W. (2021). Development of learning videos based on problem-solving characteristics of animals and their habitats contain in IPA subjects on 6th-grade. *Journal of Education Technology*, *5*(1), 37-47. https://doi.org/10.23887/jet.v5i1.32314

Anjarwati, A., Wahyuni, R., Sularn, Y.A., Utami, C., & Wardana, R.A. (2022). Penerapan media pembelajaran sistem pencernaan manusia ilmu pengetahuan alam SDN Mangunharjo 5. *Jurnal Pendidikan, Sains Dan Teknologi, 1*(2), 118-122. https://doi.org/10.47233/jpst.v1i2.291

Apriyeni, O., Syamsurizal, S., Alberida, H., & Rahmi, Y. L. (2021). Booklet pada materi bakteri untuk peserta didik kelas X SMA. *Jurnal Edutech Undiksha*, *9*(1), 8-13. https://doi.org/10.23887/jeu.v9i1.33805

Asmi, A.R. (2019). Pengembangan media pembelajaran audio berbasis podcast pada materi sejarah lokal di

Sumatera Selatan. *Historia: Jurnal Pendidik Dan Peneliti Sejarah*, *3*(1), 49-56. https://doi.org/10.17509/historia.v3i1.21017

Aspahani, E.L., Nugraha, A., & Giyartini, R. (2020). Rancangan media e-poster berbasis website pada pembelajaran IPA di sekolah dasar. *PEDADIDAKTIKA: Jurnal Ilmiah Pendidikan Guru Sekolah Dasar*, 7(2), 158-167. https://doi.org/10.17509/pedadidaktika.v7i2.25458

Babinčáková, M., & Bernard, P. (2020). Online experimentation during covid-19 secondary school closures: teaching methods and student perceptions. *Journal of Chemical Education*, *97*(9), 3295-3300. https://doi.org/10.1021/acs.jchemed.0c00748

Batubara, I.H., Sari, I.P., Hariani, P.P., Saragih, M., Novita, A., Lubis, B.S., & Siregar, E.F.S. (2021). Pelatihan software geogebra untuk meningkatkan kualitas pembelajaran matematika SMP Free Methodist 2. *Martabe: Jurnal Pengabdian Kepada Masyarakat,* *4*(3), 854-859. http://dx.doi.org/10.31604/jpm.v4i3.854-859

Bi, X., & Shi, X. (2019). On the effects of computer-assisted teaching on learning results based on blended learning method. *International Journal of Emerging Technologies in Learning*, *14*(1), 58-70. https://doi.org/10.3991/ijet.v14i01.9458

Dewi, B., Hamidah, A., & Sukmono, T. (2020). Pengembangan booklet keanekaragaman kupu-kupu di Kabupaten Kerinci dan sekitarnya sebagai sumber belajar pada materi animalia kelas X SMA. *BIODIK*, *6*(4), 492-506. https://doi.org/10.22437/bio.v6i4.9979

Dewi, N.N.K., Kristiantari, M.R., & Ganing, N.N. (2019). Pengaruh model pembelajaran picture and picture berbantuan media visual terhadap keterampilan menulis bahasa Indonesia. *Journal of Education Technology*, *3*(4), 278-285. https://doi.org/10.23887/jet.v3i4.22364

Fitriani, L. & Krisnawati, Y. (2019). Pengembangan media booklet berbasis keanekaragaman jenis jamur makroskopis. *Bioedusains: Jurnal Pendidikan Biologi dan Sains,* *2*(2), 143– 151. https://doi.org/10.31539/bioedusains.v2i2.977

Gamage, G.C.V., Lim, Y.Y., & Choo, W.S. (2021). Anthocyanins from *Clitoria ternatea* L. flower: biosynthesis, extraction, stability, antioxidant activity, and applications. *Frontiers in Plant Science, 12*(792303), 1-17. https://doi.org/10.3389/fpls.2021.792303

Gregory, R.J. (2013). *Tes Psikologi Sejarah, Prinsip dan Aplikasi*. Jakarta: Erlangga.

Habibati., Hasan, M., & Fitri, N.R. (2019). Pengembangan Media buletin menggunakan coreldraw X7 pada materi pencemaran lingkungan. *Jurnal Pendidikan Sains Indonesia (Indonesian Journal of Science Education)*, 7(1), 23–33. https://doi.org/10.24815/jpsi.v7i1.13514

Hanisah., Irhasyuarna, Y., & Yulinda, R. (2022). Pengembangan media pembelajaran interaktif menggunakan ispring suite 10 pada materi reproduksi tumbuhan untuk mengukur hasil belajar. *Jupeis: Jurnal Pendidikan Dan Ilmu Sosial*, *1*(3), 6-16. https://doi.org/10.55784/jupeis.Vol1.Iss3.68

Harlis, H., Budiarti, R. S., & Natalia, D. (2021). Pengembangan Booklet Budidaya Jamur Edible Sebagai Bahan Ajar Mikologi: (Development of Edible Mushroom Cultivation Booklet as Mycology Teaching Materials). *BIODIK*, *7*(01), 33-42. https://doi.org/10.22437/bio.v7i01.12063

Itsna, I.N., Oktiawati, A., Insani, U., & Ni'mah, J. (2022). Edukasi tentang covid dengan media booklet pada anak usia dini di Ra/Kbit Siti Khodijah Slawi. *JABI: Jurnal Abdimas Bhakti Indonesia*, *3*(2), 66-75. https://doi.org/10.36308/jabi.v3i2.424

Izzulhaq, I.A., Ulfa, A.M., & Angin, M.P. (2022). Formulasi dan uji aktivitas masker gel peel-off ekstrak bunga butterfly pea plant (*Clitoria ternatea* L.) terhadap bakteri *Staphylococcus aureus*. *Jurnal Ilmu Kedokteran dan Kesehatan, 9*(4), 1287-1299. https://doi.org/10.33024/jikk.v9i4.5656

Jeong, H.C., & So, W.Y. (2020). Difficulties of online physical education classes in middle and high school and an efficient operation plan to address them. *International Journal of Environmental Research and Public Health*, *17*(19), 72-79. https://doi.org/10.3390/ijerph17197279

Khamidah, N., Winarto, W., & Mustikasari, V.R. (2019). Discovery learning: penerapan dalam pembelajaran IPA berbantuan bahan ajar digital interaktif untuk meningkatkan prestasi belajar siswa. *Jurnal Pendidikan IPA Veteran, 3*(1), 87-99. https://doi.org/10.31331/jipva.v3i1.770

Lakshan, S.A.T., Jayanath, N.Y., Abeysekera, W.P.K.M., & Abeysekera, W.K.S.M. (2019). A commercial potential blue pea (*Clitoria ternatea* L.) flower extract incorporated beverage having functional properties. *Evidence-Based Complementary and Alternative Medicine,* 2019, 1-13. https://doi.org/10.1155/2019/2916914

Laranti, T.A.A., Rusijono, M., & Maureen, I.Y. (2023). Media pembelajaran mengenalkan Asmaul Husna untuk anak usia dini: kajian literatur. *Jurnal Ilmiah Mandala Education*, *9*(1), 337-345. http://dx.doi.org/10.58258/jime.v9i1.4601

Layal, N., Effendi, D., & Puspita, Y. (2022). Pengaruh model pembelajaran problem based learning berbasis media visual terhadap kemampuan menulis teks puisi siswa kelas X SMA Islam Az-

Zahrah Palembang. *Indonesian Research Journal on Education,* *2*(3), 1329-1336. https://doi.org/10.31004/irje.v2i3.127

Linda, R., Zulfarina, & Putra, T.P. (2021). Peningkatan kemandirian dan hasil belajar peserta didik melalui implementasi e-modul interaktif IPA terpadu tipe connected pada materi energi SMP/MTs. *Science and Physics Educational Journal, 2*(1), 18-29. https://doi.org/10.24815/jpsi.v9i2.19012

Magdalena, I., Listiani, E., Widihaningsih, R., Nurohmah, S., & Dianti, T. (2021). Pemanfaatan media sosial sebagai media pembelajaran ipa pada materi sistem pernapasan manusia kelas 5 SDN Bojong 3 Tangerang. *PENSA*, *3*(2), 361-370. https://doi.org/10.36088/pensa.v3i2.1375

Mahardika, A.I., Wiranda, N., & Pramita, M. (2021). Pembuatan media pembelajaran menarik menggunakan canva untuk optimalisasi pembelajaran daring. *Jurnal Pendidikan dan Pengabdian Masyarakat*, *4*(3), 275-281. https://doi.org/10.29303/jppm.v4i3.2817

Mandasari, B., & Aminatun, D. (2022). Investigating teachers' belief and practices toward digital media of english learning during covid-19 pandemic. *English Review: Journal of English Education*, *10*(2), 475-484. Retrieved from https://journal.uniku.ac.id/index.php/ERJEE

Moto, M.M. (2019). Pengaruh penggunaan media pembelajaran dalam dunia pendidikan. *Indonesian Journal of Primary Education*, *3*(1), 20-28. http://dx.doi.org/10.17509/ijpe.v3i1.16060

Muchlisianah, I., & Umam, K. (2022). Transformasi model pembelajaran untuk meningkatkan kualitas pembelajaran di masa pandemi covid-19: studi kasus mata pelajaran fikih kelas XI MAN 2 Mojokerto. *Jurnal Aplikasi Ilmu-ilmu Agama*, *22*(1), 49-66. https://doi.org/10.14421/aplikasia.v22i1.2804

Munisah, E. (2020). Pengelolaan media pembelajaran sekolah dasar. *Jurnal Elsa*, *18*(1), 23-32. https://doi.org/10.47637/elsa.v18i1.231

Muslimah, N.F., Sumarti, S.S., Mursiti, S., & Kasmui, K. (2023). Desain booklet berbantuan assemblr edu untuk meningkatkan hasil belajar kognitif dan minat belajar. *Chemistry in Education*, *12*(1), 9-16. https://doi.org/10.15294/chemined.v12i1.59424

Mustari, L., Indihadi, D., & Elan, E. (2020). Keterampilan menulis anak 4-5 tahun. *Jurnal PAUD Agapedia*, *4*(1), 39-49. https://doi.org/10.17509/jpa.v4i1.27195

Muswita., Yelianti, U., Intan, A., & Kusuma, L. (2020). Pengembangan booklet tumbuhan paku di Taman Hutan Raya Sultan Thaha Syaifuddin sebagai bahan pengayaan mata kuliah taksonomi tumbuhan. *Biodik: Jurnal Ilmiah Pendidikan Biologi*, *6*(1), 58–75. https://doi.org/10.22437/bio.v6i1.8642

Nevrita, N., Asikin, N., & Amelia, T. (2020). Analisis kompetensi TPACK pada media pembelajaran guru biologi SMA. *Jurnal Pendidikan Sains Indonesia*, *8*(2), 203-217. https://doi.org/10.24815/jpsi.v8i2.16709

Nuraini & Waluyo, E. (2021). Pengembangan desain instruksional model project based learning terintegrasi keterampilan proses sains untuk meningkatkan literasi sains. *Jurnal IPA dan Pembelajaran IPA*, *5*(1), 101-111. https://doi.org/10.24815/jipi.v5i1.20145

Nurdiyanti, N., Wajdi, M., & Fadhilah, N. (2022). Validitas dan kepraktisan modul digital berbasis socio scientific issue. *Jurnal IPA & Pembelajaran IPA, 6*(1), 33-44. https://doi.org/10.24815/jipi.v6i1.23461

Oktaviani, E., Daningsih, E., & Marlina, R. (2021). Kelayakan booklet submateri struktur dan fungsi jaringan tumbuhan pada tanaman monokotil. *EduNaturalia: Jurnal Biologi dan Kependidikan Biologi*, *2*(1), 7-13. http://dx.doi.org/10.26418/edunaturalia.v2i1.45188

Panjaitan, R.G.P., & Tenriawaru, A.B. (2022). Kelayakan media booklet sawi dayak (*Elephantopus mollis* Kunth) pada pembelajaran biologi mahasiswa. *Jurnal Pendidikan Sains Indonesia (Indonesian Journal of Science Education*), *10*(4), 740-751. https://doi.org/10.24815/jpsi.v10i4.26034

Panjaitan, R.G.P., Kartika, A., & Wahyuni, E.S. (2021). Kelayakan booklet materi metabolisme di kelas XII. *Jurnal Pendidikan Informatika dan Sains*, *10*(1), 1-10. https://doi.org/10.31571/saintek.v10i1.2376

Panjaitan, R.G.P., Titin, T., & Wahyuni, E.S. (2021). Kelayakan booklet inventarisasi tumbuhan berkhasiat obat sebagai media pembelajaran. *Jurnal Pendidikan Sains Indonesia (Indonesian Journal of Science Education), 9*(1), 11-21. https://doi.org/10.24815/jpsi.v9i1.17966

Pradilasari, L., Gani, A., & Khaldun, I. (2019). pengembangan media pembelajaran berbasis audio visual pada materi koloid untuk meningkatkan motivasi dan hasil belajar siswa SMA. *Jurnal Pendidikan Sains Indonesia (Indonesian Journal of Science Education), 7*(1), 9-15. https://doi.org/10.24815/jpsi.v7i1.13293

Pratimasari, D., & Lindawati, N.Y. (2018). Optimasi zat warna bunga butterfly pea plant (*Clitoria ternatea* L.) sebagai pewarna alami pada sirup parasetamol. *Jurnal Ilmiah Manuntung*, *4*(2), 89-97. https://doi.org/10.51352/jim.v4i2.187

Purba, E.C. (2020). Kembang butterfly pea plant (*Clitoria ternatea* L.): pemanfaatan dan bioaktivitas. *Jurnal*

EduMatSains, *4*(2), 111-124. https://doi.org/10.33541/edumatsains.v4i2.1377

Purnasari, P.D., & Sadewo, Y.D. (2020). Perbaikan kualitas pembelajaran melalui pelatihan pemilihan model pembelajaran dan pemanfaatan media ajar di sekolah dasar wilayah perbatasan. *Publikasi Pendidikan, 10*(2), 125-132. https://doi.org/10.26858/publikan.v10i2.13846

Purwasih, W. (2023). Meningkatkan kemampuan membaca permulaan menggunakan media kartu kata pada siswa kelas II SDN 114/VII Bukit Kalimau Ulu Kecamatan Batang Asai Kabupaten Sarolangun tahun ajaran 2022/2023. *Jurnal Ilmiah Pendidikan Dasar, 3*(1), 114-124. https://doi.org/10.37081/jipdas.v3i1.1292

Putri, D.U.P., & Baharza, S.N. (2023). Pengaruh konsumsi teh bunga butterfly pea plant (*Clitoria ternatea* L.) sebagai alternatif antioksidan dan booster imunitas pada masa pandemi covid-19. *Jurnal Ilmiah Permas: Jurnal Ilmiah STIKES Kendal*, *13*(1), 109-118. https://doi.org/10.32583/pskm.v13i1.571

Putri, N.H., Syamsurizal, S., & Atifah, Y. (2021). Booklet sistem ekskresi pada manusia sebagai suplemen bahan ajar biologi kelas XI SMA. *Journal for Lesson and Learning Studies, 4*(3), 309-314. https://doi.org/10.23887/jlls.v4i3.38136

Rahmadani, N.S., Melati, R., & Sudjud, S. (2022). The effect of types of pea organic fertilizers and intervals of application on the vegetative growth of butterfly pea (*Clitoria ternatea* L.). *Jurnal Agribisnis Perikanan, 15*(2), 776-782. https://doi.org/10.52046/agrikan.v15i2.1366

Rani, B.K., Widiyaningrum, P., & Anggraito, Y.U. (2020). Effectiveness of research based booklet media of conventional biotechnology application as a supplement of biotechnology teaching materials in senior high school. *Journal of Innovative Science Education, 9*(3), 295-300. Retrieved from http://journal.unnes.ac.id/sju/index.php/jise

Refwalu, M.H., Indrayati, A., & Purwidyaningrum, I. (2023). Studi mekanisme molekuler antibakteri dari daun butterfly pea plant (*Clitoria ternatea* L.). *Jurnal Farmasi Indonesia, 20*(1), 32-45. https://doi.org/10.25026/jsk.v5i1.1512

Rezaldi, F., Abdilah, N. A., Pertiwi, F. D., Fadillah, M. F., Setiawan, U., Sasmita, H., & Somantri, U. W. (2022). Pelatihan pembuatan sabun mandi kombucha bunga telang kepada mahasiswa farmasi pada mata kuliah bioteknologi. *Jurnal Pengabdian Pada Masyarakat Indonesia, 1*(1), 7-19. https://doi.org/10.55542/jppmi.v1i1.179

Romika, R., Yeni, L.F., & Tenriawaru, A.B. (2022). Kelayakan booklet jamur kelas X SMA dari hasil inventarisasi jamur makroskopis. *Jurnal Pendidikan dan Pembelajaran Khatulistiwa*, *11*(7), 567-575. Retrieved from https://jurnal.untan.ac.id/index.php/jpdpb/article/view/56067/75676593712

Rosidah, C.T.R.T., Febrianti, D.R., Budi, T., & Berliyani, S. (2023). Sosialisasi manfaat bunga butterfly pea plant dan pengolahannya: KKN mahasiswa Universitas PGRI Adi Buana di Desa Betro. *Kanigara, 3*(1), 89-94. https://doi.org/10.36456/kanigara.v3i1.6872

Sari, A.P. & Setiawan, A. (2018). The development of internet based economic learning media using moodle approach. *International Journal of Active Learning, 3*(2), 100- 109. Retrieved from http://journal.unnes.ac.id/nju/index.php/ijal

Sumartini, S. (2020). Analisis bunga butterfly pea plant (*Clitoria ternatea* L.) dengan variasi pH metode liquid chromatograph-tandem mass spectrometry (lc-ms/ms). *Pasundan Food Technology Journal, 7*(2), 70-77. https://doi.org/10.23969/pftj.v7i2.2983

Suryana, A., Noviansyah, I., & Tamara, F. (2022). Pengaruh media audio visual terhadap prestasi belajar siswa di Madrasah Ibtidaiyah Nurul Ilmi Citeureup Bogor. *EduInovasi: Journal of Basic Educational Studies*, *2*(2), 112-132. https://doi.org/10.47467/edui.v2i2.975

Suryani, N., & Ardianto, D.T. (2019). Digital flipbook empowerment as a development means for history learning media. *Jurnal Pendidikan Indonesia*, *8*(2), 266-275. https://doi.org/10.23887/jpi-undiksha.v8i2.24122

Susanah, S.S., Palupi, E.L.W., & Fardah, D.K. (2020). Pelatihan pembuatan media pembelajaran matematika di SD Karah I Surabaya. *Jurnal ABDI: Media Pengabdian Kepada Masyarakat*, *5*(2), 83-88. https://doi.org/10.26740/ja.v5n2.p83-88

Swastyastu, L.T.J. (2020). Manfaat media pembelajaran dalam pemerolehan bahasa kedua anak usia dini. *Pratama Widya: Jurnal Pendidikan Anak Usia Dini*, *5*(1), 52-59. https://doi.org/10.25078/pw.v5i1.1359

Syamsurizal, S., & Ardianti, R. (2021). Analisis kebutuhan pengembangan booklet sistem koordinasi sebagai suplemen bahan ajar biologi kelas XI SMA/MA. *Journal for Lesson and Learning Studies, 4*(3), 404-410. https://doi.org/10.23887/jlls.v4i3.38685

Taufik, I.S.C., & Ainiyah, N. (2021). Pharmacological activities of *Clitoria ternatea* L. *Infokes*, *11*(1), 379-387. Retrieved from https://jurnal.ikbis.ac.id/infokes/article/view/392

Tsekeris, C. (2019). Surviving and thriving in the fourth industrial revolution: digital skills for education and society. *Homo virtualis*, *2*(1), 34-42. https://orcid.org/0000-0002-3304-5331

Wahid, A. (2018). Jurnal Pentingnya Media Pembelajaran Dalam Meningkatkan Prestasi Belajar. *Istiqra: Jurnal Pendidikan dan Pemikiran Islam*, *5*(2). Retrieved from https://www.jurnal.umpar.ac.id/index.php/istiqra/article/view/461

Winarto, W., Syahid, A., & Saguni, F. (2020). Effectiveness the use of audio visual media in teaching islamic religious education. *International Journal of Contemporary Islamic Education*, *2*(1), 81-107. https://doi.org/10.24239/ijcied.Vol2.Iss1.14

Wulandari, Y., Ruhiat, Y., & Nulhakim, L. (2020). Pengembangan media video berbasis powtoon pada mata pelajaran IPA di kelas V. *Jurnal Pendidikan Sains Indonesia, 8*(2), 269-279. https://doi.org/10.24815/jpsi.v8i2.16835

Yazhini, K., Ramesh, R., Kumar, R. (2023). Evaluation of anti-inflammatory property of mouthwash using ethanolic extract of *Clitoria Ternatea* L. An in vitro study. *Journal of Survey in Fisheries Sciences*, *10*(1S), 404-410. https://doi.org/10.17762/sfs.v10i1S.186

Yeni, H.O., Anggraini, C., & Meilina, F. (2020). Upaya meningkatkan hasil belajar siswa dalam pembelajaran IPA dengan menggunakan media visual pada siswa kelas IV SDN 002 Tebing Kabupaten Karimun tahun ajaran 2017/2018. *Jurnal Minda*, *1*(2), 10-18. Retrieved from https://ejurnal.universitaskarimun.ac.id/index.php/mindafkip/article/view/119

Yuliana, Muldayanti, N.D., & Kahar, A.P. (2019). Studi komparasi media pembelajaran booklet berbasis sikap konservasi dan media gambar terhadap hasil belajar pada materi keanekaragaman hayati di SMA/MA Kecamatan Rasau Jaya. *Jurnal Bioeducation, 6*(2), 50–54. http://dx.doi.org/10.29406/.v6i2.1179

Zakiah, N.E., Sunaryo, Y., & Amam, A. (2019). Implementasi pendekatan kontekstual pada model pembelajaran berbasis masalah berdasarkan langkah-langkah polya. *Teorema: Teori dan Riset Matematika, 4*(2), 111-120. http://dx.doi.org/10.25157/teorema.v4i2.2706