

The effect of digital booklets “Crustaceae diversity at mangrove Sangiang Island” on students' conservation attitude using problem-based learning

Indria Wahyuni *, Dwi Ratnasari, Mahrawi, Inayah

Department of Biology Education, Faculty of Teacher Training and Education, Universitas Sultan Ageng Tirtayasa, Serang City, Banten, Indonesia

*Corresponding Author Email: 2224180009@untirta.ac.id

Article Information

Keyword:

Digital booklet; Crustaceae diversity; Mangrove ecosystem; Problem based learning; Conservation attitude

Kata Kunci:

Booklet digital; Keanekaragaman crustaceae; Ekosistem mangrof; Pembelajaran berbasis masalah; Sikap konservasi

History:

Received : 16/09/2022

Accepted : 26/10/2022

Abstract

The rapid advancement of technology causes educators to be ready to use digital-based learning media. This study aims to determine the effect of the digital booklet on the diversity of mangrove crabs on Sangiang Island in the Problem Based Learning (PBL) model on students' conservation attitudes. This research method uses a quasi-experimental design with a post-test-only control group design. The research sample was taken using a purposive sampling technique. This study used two sample groups, namely the control and experimental groups. Data collection uses a questionnaire which is accessed via a Google form. The questionnaire contains questions about the conservation attitudes character of as many as 50 items; with a value scale from 1-4. The results showed an effect of using digital booklets on the conservation attitude of students at SMA Negeri 4 Serang City. The average conservation attitude in the experimental class got a fairly high score of 55, while the control class got a score of 54. This value is the result of the accumulation of five characteristics of attainment of conservation attitudes, namely knowledge, concern, skills, attitudes, and participation. Based on these results, using digital media, one of which is a booklet, can be a solution for achieving the competence of students' conservation attitudes.

Abstrak

Pesatnya kemajuan teknologi menyebabkan para pendidik harus siap memanfaatkan media pembelajaran berbasis digital. Penelitian ini bertujuan untuk mengetahui pengaruh booklet digital keanekaragaman kepiting bakau di pulau Sangiang dengan model *Problem Based Learning* (PBL) terhadap sikap konservasi siswa. Metode penelitian ini menggunakan *quasi experiment* dengan rancangan *post-test only control group design*. Pengambilan sampel penelitian menggunakan teknik *purposive sampling*. Penelitian ini menggunakan dua kelompok sampel yaitu kelompok kontrol dan eksperimen. Pengumpulan data menggunakan angket yang diakses melalui *Google form*. Angket berisi pertanyaan tentang karakter sikap konservasi sebanyak 50 butir soal, dan dilengkapi dengan skala nilai dari 1-4. Hasil penelitian menunjukkan adanya pengaruh penggunaan booklet digital terhadap sikap konservasi siswa di SMA Negeri 4 Kota Serang. Rata-rata sikap konservasi di kelas eksperimen mendapatkan nilai yang cukup tinggi yaitu sebesar 55 sedangkan untuk kelas kontrol memperoleh nilai 54. Nilai tersebut adalah hasil akumulasi dari lima karakter ketercapaian sikap konservasi yaitu pengetahuan, kepedulian, keterampilan, sikap, dan partisipasi. Berdasarkan hasil tersebut, penggunaan media digital salah satunya berbentuk booklet dapat menjadi solusi untuk ketercapaian kompetensi sikap konservasi peserta didik.

A. Introduction

The increasing development of technology has a concerning impact, particularly in Indonesia, as is the education case, which must generate graduates of high quality. According to Suminar (2019); Sukmawati & Nensia (2019), technology and learning media cannot be separated, and students must use technology. That technology can be utilized to develop effective learning media for teachers to impart information to pupils. Tamrin et al. (2017) state in teaching a teacher cannot be separated from the learning media. But, according to Churiyah et al. (2020); Mardiana (2020) the percentage of teachers who stutter in technology is still high.

According to the results of interviews conducted with biology teachers at 4 State Senior High School, Serang City, there were issues with media use throughout the learning process. The teacher used textbooks, workbooks, and occasionally visual media with a projector; the learning material needs to be updated. During the learning process, students are deemed less active and unable to comprehend the provided material. This instance contributes to students' less-than-optimal learning outcomes. In addition, teachers were less concerned with character education principles such as conservation attitudes since they were more concerned with imparting knowledge. The teacher stated that there was a need for learning instruments that may affect students' enthusiasm for learning, particularly in kingdom Animalia material, and could educate them on conservation attitudes.

This research is a follow-up study to the 2016 construction of a digital booklet titled "Diversity of Mangrove Crab on Sangiang Island" by Dwi Lailatul Hasanah, a biology education student. The scope of the biological material addressed in the book is Kingdom Animalia, the invertebrate sub-concept that explains the crabs on Sangiang Island. This study intended to show how digital booklets affect the conservation attitudes of students at SMA Negeri 4 Serang City regarding the diversity of crustaceans in the mangroves of Sangiang Island.

When it comes to biodiversity, Indonesia is known as a mega-biodiversity country. Although Indonesia boasts a diverse biodiversity, it has one of the most significant rates of species extinction. Scheffers et al. (2019) state one of the causes of extinction is the trade in animals which are sometimes concentrated in certain phylogenetic groups. In addition, wildlife trade hotspots are concentrated in biologically diverse tropical regions. In addition, according to Poor et al. (2019),

another cause is infrastructure development which should be tightened if it is located around protected areas or endemic ecosystems. Then Lestari et al. (2021) stated that an understanding of conservation needs to be instilled from an early age; it can even be included in the attitude competence of students at school.

Simple habits such as students being careless in carrying out the task of throwing garbage and caring plants can be noticed in the school environment (Amelia et al., 2018). The habit of throwing garbage and caring plants is one of the activities that show the conservation attitude of students (Situmorang & Tarigan, 2018; Mardhiah et al., 2021). Thus, various media and learning styles must be employed to teach conservation attitudes to children.

A digital booklet is a material that can be used as a learning media. Digital technology is claimed to improve student retention and give limitless information more suited to the 21st-century learning model (Mawarni & Muhtadi, 2017). Booklets can be developed in accordance with the demands of the curriculum so that the description of the material is relevant to the competencies that must be achieved by students (Maisyura et al., 2021), and accurate to the development of students (Nisa et al., 2021). Furthermore, there is a need for a model that can assist pupils in learning more successfully to use a terrifying digital booklet. Problem-Based Learning (PBL) is the applicable variation of the learning model.

The Covid-19 pandemic has severely impacted the education sector, particularly weakening the learning process and forcing it to be conducted online. According to the findings of Basar (2021), children may comprehend the content of online media, internet networks that occasionally face disturbance, or at the very least, the learning media utilized by online teachers. However, certain learning media cannot adequately communicate if the learning content requires tools for educators. As a result, students are more theoretically capable after graduation but do not use the knowledge learned during the learning process.

Character education values are necessary for implementation in daily life. Intania & Sutarna (2020) stated that the purpose of character education is to instill in students a sense of responsibility for community, national, and state life. Through studying the sub-concept of invertebrates in the material kingdom Animalia,

one of the features that may teach students is applying a conservation mindset.

Responding to the problems found, researchers are interested in research that uses technology and its effect on students' conservation attitudes. Based on this motivation, this study aimed to examine the effect of using a Digital Booklet on Crustaceae Diversity in the Mangrove Ecosystem of Sangiang Island with the PBL model on the conservation attitudes of SMA Negeri 4 Serang City students.

B. Material and Method

This study's population consisted of all 6 (six) classes of class X Mathematics and Natural Sciences Department students at 4 State Senior High School; Serang City. The sample for this study was obtained using a purposive sampling technique, in which groups were chosen based on particular criteria. The two classes were chosen based on numerous factors, one of which was a request from a class X biology instructor.

This study employed a quasi-experimental design, using a Post-test Only Control Group (see Table 1). The experimental and control groups were not randomly selected; however, based on several characteristics (Sugiyono, 2015). The experimental and control classes received different treatments in this design. The treatment utilized for the experimental class in the form of learning media, specifically digital booklets. In contrast, the control class was solely given modules provided by the school during the learning process.

Table 1 Schematic of Post-Test Only Control Group Design

Group	Treatment	Post
Experiment	X	0
Control	-	0

(Source: Sugiyono, 2015)

The data collection techniques carried out in this study, namely interview sheet, questionnaire, and documentation. The researcher then does a validity test to evaluate whether the instrument utilized is valid for the instrument test data analysis approach. Simultaneously, data processing approaches employ objective test analysis, where objective tests are tests designed to produce outcomes with objective values (Purwanto, 2010). The students' conservation attitude scores were interpreted using the criteria in Table 2.

For data analysis, researchers employed three techniques: the Kolmogorov-Smirnov normality test, the Levene homogeneity test, and

hypothesis testing. The tests were conducted using the Independent Sample T-Test.

Table 2 Interpretation Criteria for Student Conservation Attitude Score

Criteria	Categori
81-100	Very high
61-80	High
41-60	Fairly
21-40	Low
0-20	Very low

(Source: Ridwan, 2012)

C. Results and Discussion

This project is a continuation of Dwi Lailatul Hasanah's 2016 biology education student class's construction of a digital booklet titled "Diversity of Mangrove Crab on Sangiang Island," published in 2020 with Wahyuni (see Figure 1). The scope of the biological material addressed in the book is Kingdom Animalia, the invertebrate sub-concept focusing on explaining the crabs on Sangiang Island. This study aimed to see if digital booklets affect the diversity of crustaceans in the Sangiang Island mangroves in the PBL model on the conservation attitude of students at SMA Negeri 4 Serang City.

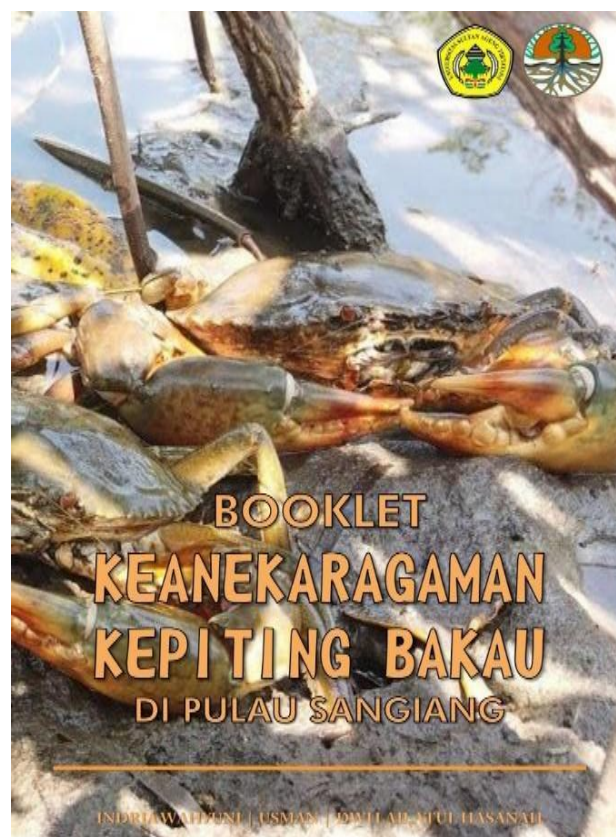


Figure 1
Example of a Digital Booklet (Source: Wahyuni, 2020)

The PBL model employs a teaching and learning technique with direct student participation; thus, students can use their mental processes to determine the studied topic or theory learned (Ramadhani et al., 2019; Sakliressy et al., 2021). The PBL model is a teaching and learning strategy that requires student participation to locate the subject or theory studied through their mental processes (Fathurrohman, 2015).

The findings demonstrate that learning outcomes differ between those taught utilizing digital booklet media and those taught using only school modules. On the other hand, the experimental class's media is delivered in the form of information that is more fascinating, easy to understand, and portable because the learning media employed is digital-based. Furthermore, the structure of this digital booklet is significantly shorter than the school modules, the presentation and photos are more appealing, and it is loaded with conservation knowledge. Aside from the media used, the learning model is also essential. Both the experimental and control groups employed PBL model. However, when learning occurs, the control class is passive, or pupils' activeness in paying attention to the teacher's explanation is still missing. During talks, some students converse with their peers.. Regarding the experimental class, students tend to be more engaged in the learning process and during conversations concerning regional issues and

conservation efforts in the natural reserve area of the Banten Region. Consequently, the experimental and control classes achieve distinct learning outcomes.

Students in the experimental class are more active during discussions accompanied by an active reading of digital booklet media, which is employed as a learning resource. This is proportionate to the control group. Edy (2016) asserts that personalized and specially developed learning media can contribute to the successful learning of all students and assist students in accomplishing learning objectives. According to Shams-Abadi (2015), the success of achieving optimal learning outcomes for students is dictated by the teacher's learning materials. In other words, digital booklet media can help students learn more efficiently and under teacher expectations, boosting classroom learning quality.

Figure 2 depicts the average value of students' conservation attitudes. Following are the results of a post-learning assessment of students' conservation attitudes using a questionnaire (post-test). The survey employed a Likert scale with a minimum of 1 and a maximum of 4 points. The researcher delivered questionnaires to 64 students from two classes: X MIA 3 (31 students) as the control class and X MIA 6 (31 students) as the experimental class. Figure 2 depicts the obtained the students' conservation attitudes average value.

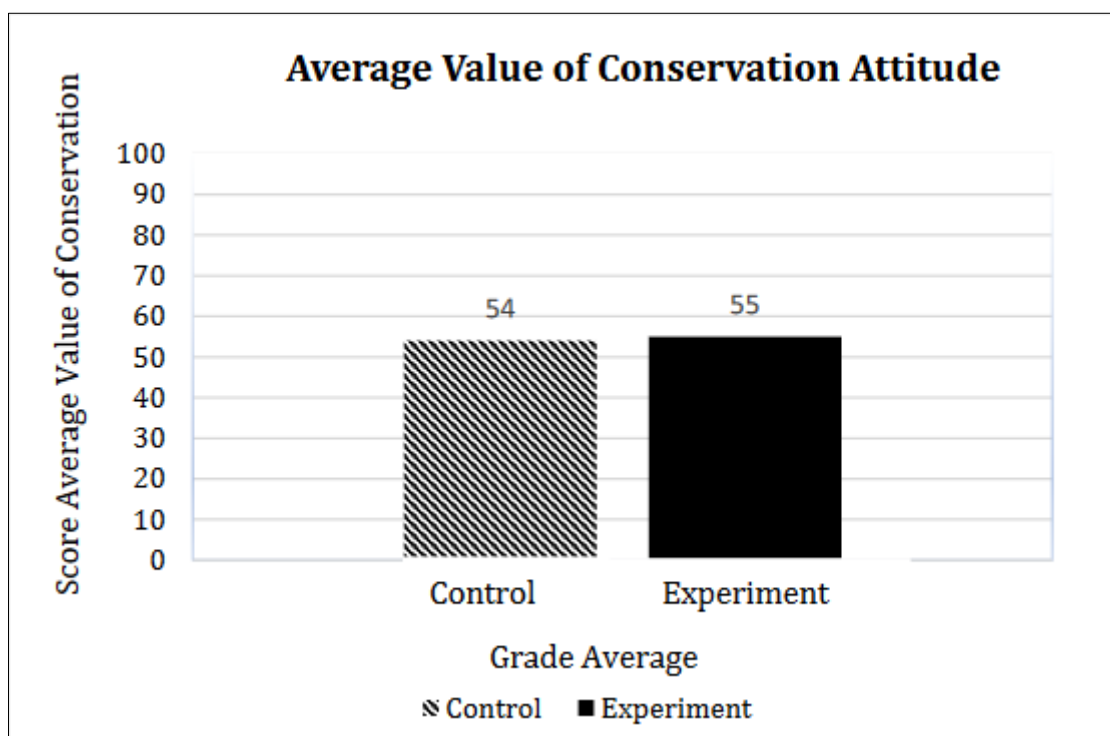


Figure 2
The results of the average value of students' conservation attitudes

According to Figure 2, the average conservation attitude score of students in the experimental class is more significant compared to in the control class. The average student in the lab class has a grade of 55%; however, the average student in the control class has a grade of 54%. Both classes fall into the good category (Ridwan, 2012). The difference in student retention settings in the experimental class, which is higher than in the control class, is due to the experimental class's usage of digital booklets as a learning resource.

According to the preceding explanation, a significance value of 0.087 was achieved for the experimental class and 0.200 for the control class, which was corroborated by the findings of the normality test. These results reveal a significance level greater than 0.05, indicating that all data are typically distributed. The significance of homogeneity results for the retention setting of $0.668 > 0.05$ indicates that the data is

homogeneous. Using a t-test on independent samples, the hypotheses were assessed. The independent sample t-test is 0.668, which is significantly more than 0.05. This indicates that H_0 is within acceptable bounds or that employing digital booklets in problem-based learning models affects the conservation attitude of class X science students on the Invertebrate sub-concept.

Conservation attitudes must be instilled in children at a young age if conservation initiatives are successful. This conservation mindset is measured by (1) knowledge, (2) awareness, (3) skill, (4) attitude, and (5) participation (Kurniasih, 2018). The conservation attitude index employed in this study is the Kurniasih index. A questionnaire with 50 positive questions was used in this study to assess conservation. Students can access the survey through the researcher's Google Forms. Figure 3 shows the conservation attitude questionnaire data findings for the experimental and control classes.

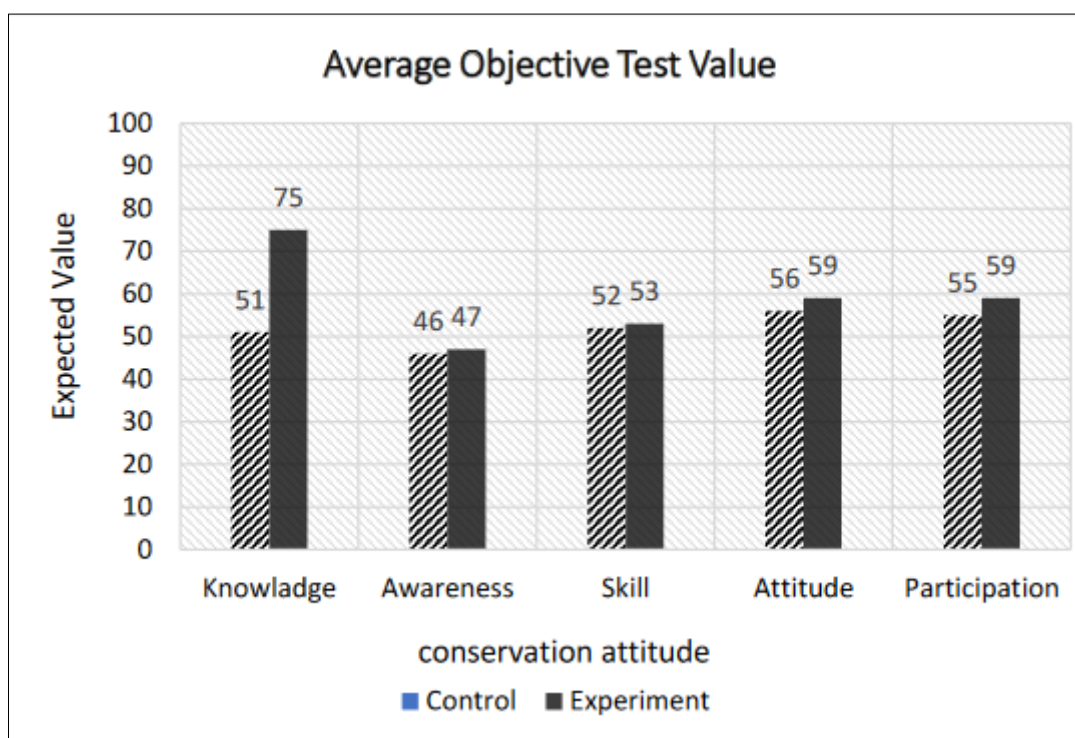


Figure 3

The average results of the objective test scores for the conservation attitude of students in the experimental and control classes

In Character 1, the Experiment and Control classes received 75 and 51. Students displayed an excellent understanding of conservation issues, aided by using various learning mediums, particularly when it was related to everyday life. The experimental class received a digital booklet; on the other hand, the control class solely used the school's modules. A comparatively high level of knowledge about environmental conservation means that an individual's level of knowledge will

be higher. Thus his or her level of concern for the environment will rise. This is also supported by Kurniarum et al. (2015) assertion that increased awareness leads to increased engagement due to the requisite procedures and forms of protection.

In character 2, the control class achieves a score of 47, while the experimental class achieves a score of 46. According to Hidayat (2017), the caring character begins with knowledge and information, which leads to a desire to do

something, create behavior from individuals, and produce something for the environment. It is apparent from the information that the difference in values received influences the caring character of pupils at SMA Negeri 4 Serang City. Then, for character 3, which is about skills, Machin (2014) writes that skills are produced through a learning process that employs an approach that results in environmentally conscious works. The preceding two components, knowledge and concern also promote this. When these two factors are combined, pupils will be motivated to practice environmental conservation.

In character 3, the experimental class receives a score of 53, whereas the control class receives a score of 52; this character is the highest score received by the experimental class. This demonstrates that the experimental class went through a learning process that used an approach that produced works centered on environmental conservation. In character 4, both the experimental and control classes have similar scores since the experimental class receives a score of 59 while the control class has a score of 56; this is proven by the attitude of pupils who have utilized reusable products.

The experimental class scored 59 in character 5 about student conservation participation, while the control class received a 54. The difference is evident because there is a considerable difference in value; the experimental class has values that fall into the high category regarding knowledge, concern, skills, and attitudes (Ridwan, 2012). This occurred because the four characters were interconnected. Even the experimental class had a high level of engagement in the learning process. This was distinct from the usage of learning material, specifically digital booklets, as opposed to the control group, which tended to be inactive. Only a few children understand the lesson.

Previously, the study of students' conservation attitudes was geared toward a learning model in which students may become more active in conservation activities with the assistance of SIRS (Species Identification and Response Software). Kurniasih (2018) did this research on improving the nature of biodiversity conservation by utilizing species detection and response software. The SIRS is recommended for conservation learning courses because it can improve conservation traits such as knowledge, awareness, attitudes, skills, and engagement. The outcome of this application is for the Biodiversity Conservation course, which should promote the nature of conservation while also contextualizing

and relevant to the lecture. Na'imah et al. (2022) also found that the material on biodiversity based on local wisdom with one of the basic competencies, namely analysis of variation in threats and conservation of biodiversity, succeeded in having a positive impact on students' critical thinking skills and environmental care attitudes. This is consistent with Venuste et al. (2017), who discovered a link between knowledge and attitudes, with aspects of knowledge influencing aspects of attitudes. The optimistic attitude will grow in tandem with your knowledge. This is also supported by Kurniarum et al. (2015), because of the necessary procedures and forms of protection, greater understanding leads to greater engagement.

Research on printed and digital booklets has been carried out several times. However, booklet research to develop students' conservative attitudes is still difficult to find. In addition, the advantage of booklets is that they are easy to carry because they are more compact than ordinary books. Especially if it is made in digital form, it is more practical and interactive. This advantage is because the use of technology makes learning closer to the lives of students at this time.

The use of technology has proven to help spread knowledge about conservation (Adnyana et al., 2022), and to help teachers teach conservative attitudes to students (Sabiri, 2020). Learning media continues to change with the times. In this era of the industrial revolution 4.0, technology-based learning media have become closer to students and become the center of attention (Wulandari, 2021), of course, cannot be separated from the material presented, especially with attractive design, simple language style, and complete with supporting photos and illustrations (Zainudin et al., 2020).

D. Conclusion

Digital booklets as learning media are a breakthrough in facilitating teaching and learning activities using technological advances. However, they are still supported by models tailored to student's needs in the classroom, such as the PBL model. This research results show digital books with the PBL model affect the conservation attitude of class X MIA students on the invertebrate sub-concept material at SMA Negeri 4 Serang City. These results occur since there is a correlation or relationship between the character of the conservation attitude to be achieved in this study and the experimental class's character knowledge, awareness, skills, attitude, and participation. The experimental class excels in these areas, but this is

not the case for the control class. Based on these results, using digital booklet media can be a solution for achieving the competence of students' conservation attitudes because digital-based learning media have become closer to students with technological advances.

E. References

- Adnyana, I. M. D. M., & Sudaryati, N. L. G. (2022). The potency of green education-based blended learning in biology students at the Hindu University of Indonesia. *BIO-INOVED: Jurnal Biologi-Inovasi Pendidikan*, 4(1), 1-9. DOI: <http://dx.doi.org/10.20527/bino.v4i1.11047>
- Amelia, D. R., Sumantri, M. S., & Utomo, E. (2018). Establishing character education in elementary school: Increasing concern and environmental responsibility through habiting and modeling working group activities. *International Journal of Multidisciplinary and Current Research*, 6, 779-785. DOI: <https://doi.org/10.14741/ijmcr/v.6.4.15>
- Basar, A. M. (2021). Problematika pembelajaran jarak jauh pada masa pandemi Covid-19:(Studi kasus di SMPIT Nurul Fajri-Cikarang Barat-Bekasi). *Edunesia: Jurnal Ilmiah Pendidikan*, 2(1), 208-218. DOI: <https://doi.org/10.51276/edu.v2i1.112>
- Churiyah, M., Sholikhah, S., Filianti, F., & Sakdiyyah, D. A. (2020). Indonesia education readiness conducting distance learning in Covid-19 pandemic situation. *International Journal of Multicultural and Multireligious Understanding*, 7(6), 491-507. DOI: <http://dx.doi.org/10.18415/ijmmu.v7i6.1833>
- Edy, S. (2016). *Manajemen sumber daya manusia*. Jakarta: Kencana Prenada Media Group.
- Fathurrohman, M. (2015). *Model-model pembelajaran inovatif*. Yogyakarta: Ar-Ruzz Media.
- Hidayat, N. H. (2017). Pengaruh program konservasi hutan kota oleh (pemerintah dan swasta) dan kepedulian masyarakat terhadap konservasi hutan kota (2013). *Jurnal Green Growth dan Manajemen Lingkungan*, 6(2), 16-31. DOI: <http://doi.org/10.21009/jgg.062.02>
- Intania, E. V., & Utama, S. (2020). The role of character education in learning during the COVID-19 pandemic. *Jurnal Penelitian Ilmu Pendidikan*, 13(2), 129-136. DOI: <http://dx.doi.org/10.21831/jpipfp.v13i2.32979>
- Kurniarum, M., Prihanta, W., & Wahyuni, S. (2015). Pengetahuan dan sikap masyarakat terhadap konservasi penyu dan ekowisata di Desa Hadiwarno Kabupaten Pacitan sebagai sumber belajar biologi. *JPBI (Jurnal Pendidikan Biologi Indonesia)*, 1(2), 124-137. DOI: <https://doi.org/10.22219/jpbi.v1i2.3321>
- Kurniasih, M. D. (2018). Menumbuhkan karakter konservasi biodiversitas melalui penerapan Species Identification and Response Software. *Edu Sains: Jurnal Pendidikan Sains dan Matematika*, 6(2), 30-41. DOI: <https://doi.org/10.23971/eds.v6i2.991>
- Lestari, H., Ali, M., Sopandi, W., & Wulan, A. R. (2021). Infusion of environment dimension of ESD into science learning through the RADEC learning model in Elementary Schools. *Jurnal Penelitian Pendidikan IPA*, 7(SpecialIssue), 205-212. DOI: <https://doi.org/10.29303/jppipa.v7iSpecialIssue.817>
- Machin, A. (2014). Implementasi pendekatan saintifik, penanaman karakter dan konservasi pada pembelajaran materi pertumbuhan. *Jurnal Pendidikan IPA Indonesia*, 3(1), 28-35. DOI: <https://doi.org/10.15294/jpii.v3i1.2898>
- Maisyura, N., Ajizah, A., & Amintarti, S. (2021). The validity of learning media on the form of booklet types of Bryophytes in the riverbanks of Wisata Alam Sungai Kembang for Senior High School Student grade X. *BIO-INOVED: Jurnal Biologi-Inovasi Pendidikan*, 3(2), 66-71. DOI: <http://dx.doi.org/10.20527/bino.v3i2.9968>
- Mardiah, I., Hakam, A., & Hadiyanto, A. (2021, May). Developing environmental care attitudes among college students through islamic education (IRE) learning with a humanist-contextual approach. In *IOP Conference Series: Earth and Environmental Science* (Vol. 743, No. 1, p. 012004). IOP Publishing. DOI: <https://doi.org/10.1088/1755-1315/743/1/012004>
- Mardiana, H. (2020). Lecturers' attitudes towards online teaching in the learning process. *Register Journal*, 13(1), 77-98. DOI: <https://doi.org/10.18326/rgt.v13i1.77-98>
- Mawarni, S., & Muhtadi, A. (2017). Pengembangan digital book interaktif mata kuliah pengembangan multimedia pembelajaran interaktif untuk mahasiswa teknologi pendidikan. *Jurnal Inovasi Teknologi Pendidikan*, 4(1), 84-96. DOI: <https://doi.org/10.21831/jitp.v4i1.10114>
- Na'imah, N. N., Widiyaningrum, P., & Martuti, N. K. T. (2022). Effectiveness of local potential-based biodiversity e-booklets on students' critical thinking skills. *Journal of Innovative Science Education*, 11(3), 258-268. DOI: <https://doi.org/10.15294/jise.v10i1.54086>
- Nisa, K., Ajizah, A., & Amintarti, S. (2021). The validity of learning media in the form of booklet types of Pteridophyta (Fern) in the Riverbanks of Wisata Alam Sungai Kembang for Senior High

- School grade X. *BIO-INOVED: Jurnal Biologi-Inovasi Pendidikan*, 3(2), 92-97. DOI: <http://dx.doi.org/10.20527/bino.v3i2.9978>
- Poor, E. E., Jati, V. I., Imron, M. A., & Kelly, M. J. (2019). The road to deforestation: Edge effects in an endemic ecosystem in Sumatra, Indonesia. *PloS One*, 14(7), 1-13. DOI: <https://doi.org/10.1371/journal.pone.0217540>
- Purwanto, N. (2010). *Prinsip-prinsip dan teknik evaluasi pengajaran*. Bandung: Remaja Rosdakarya.
- Ramadhani, R., Rofiqul, U. M. A. M., Abdurrahman, A., & Syazali, M. (2019). The effect of flipped-problem based learning model integrated with LMS-google classroom for senior high school students. *Journal for the Education of Gifted Young Scientists*, 7(2), 137-158. DOI: <https://doi.org/10.17478/jegys.548350>
- Ridwan, R. (2012). *Belajar mudah penelitian untuk guru-karyawan dan peneliti pemula*. Bandung: Alfabeta.
- Sabiri, K. A. (2020). ICT in EFL teaching and learning: A systematic literature review. *Contemporary Educational Technology*, 11(2), 177-195. DOI: <https://doi.org/10.30935/cet.665350>
- Sakliressy, M. T., Sunarno, W., & Nurosyid, F. (2021). Students scientific attitude in learning physics using problem based learning model with experimental and project methods. *Jurnal Ilmiah Pendidikan Fisika Al-Biruni*, 10(1), 59-70. DOI: <https://doi.org/10.24042/jipfalbiruni.v10i1.8347>
- Scheffers, B. R., Oliveira, B. F., Lamb, I., & Edwards, D. P. (2019). Global wildlife trade across the tree of life. *Science*, 366(6461), 71-76. DOI: <https://doi.org/10.1126/science.aav5327>
- Shams-Abadi, B. B., Ahmadi, S. D., & Mehrdad, A. G. (2015). The effect of Edmodo on EFL learners' writing performance. *International Journal of Educational Investigations*, 2(2), 88-97. Retrieved from http://www.ijeionline.com/attachments/article/36/IJEIonline_Vol.2_No.2_015-2-08.pdf
- Situmorang, R. P., & Tarigan, S. D. (2018). Cultivating students' environmental awareness by creating bottle garden in school: A qualitative study. *JPBI (Jurnal Pendidikan Biologi Indonesia)*, 4(3), 263-270. DOI: <https://doi.org/10.22219/jpbi.v4i3.6785>
- Sugiyono, S. (2015). *Metode penelitian pendidikan: pendekatan kuantitatif, kualitatif, dan R&D*. Bandung: Alfabeta.
- Sukmawati, S., & Nensia, N. (2019). The role of Google Classroom in ELT. *International Journal for Educational and Vocational Studies*, 1(2), 142-145. DOI: <https://doi.org/10.29103/ijevs.v1i2.1526>
- Suminar, D. (2019, May). Penerapan teknologi sebagai media pembelajaran pada mata pelajaran sosiologi. In *Prosiding Seminar Nasional Pendidikan FKIP* (Vol. 2, No. 1, pp. 774-783), Universitas Sultan Ageng Tirtayasa Banten. Retrieved from <https://jurnal.untirta.ac.id/index.php/psnp/article/view/5886>
- Tamrin, M., Azkiya, H., & Sari, S. G. (2017). Problems faced by the teacher in maximizing the use of learning media in Padang. *Al-Ta Lim Journal*, 24(1), 60-66. DOI: <http://dx.doi.org/10.15548/jt.v24i1.262>
- Venuste, N., Olivier, H., & Valens, N. (2017). Knowledge, attitudes and awareness of pre-service teachers on biodiversity conservation in Rwanda. *International Journal of Environmental and Science Education*, 12(4), 643-652. Retrieved from <http://www.ijese.net/makale/1834.html>
- Wahyuni, I., Usman & D.L. Hasanah. (2020). *Booklet keanekaragaman kepiting bakau di Pulau Sangiang*. Banten: FKIP Universitas Sultan Ageng Tirtayasa.
- Wulandari, A. (2021). Validity of physics mobile learning media Edupark of Bayangsani South Coast Fluid on fluid material for High School Students using the Android Studio Application. *Pillar of Physics Education*, 13(4), 475-483. DOI: <http://dx.doi.org/10.24036/10154171074>
- Zainudin, Z., Arifin, Y. F., & Winarti, A. (2020). Development of field guide book identification of Anuran Species in Lambung Mangkurat KHDTK: The result of expert review. *BIO-INOVED: Jurnal Biologi-Inovasi Pendidikan*, 2(2), 76-82. DOI: <http://dx.doi.org/10.20527/bino.v2i2.8784>