ISSN 2964-4291
https://proceeding.unnes.ac.id/index.php/iset

Development of E-plantbook Learning Resources based on Mobile Learning Applications with a Scientific Approach

Maila Shofa Maghfiroh, Enni Suwarsi Rahayu, Talitha Widiatningrum

Pascasarjana, Universitas Negeri Semarang, Indonesia
*Corresponding Author: Mailashofa@students.unnes.ac.id

Abstract. The development of mobile learning application-based e-plantbook with a scientific approach is one of the efforts to improve the quality of an ideal learning resource for Plantae material in Senior High School. This study aims to develop mobile learning application-based e-plantbook with a scientific approach for Plantae material that was tested to measure the level of validity and practicality at SMA Negeri 1 Kembang, Jepara Regency, Central Java Province. This study used the Research and Development (R and D) method by S. Thiagarajani, Dorothy and Melvyn I. The results of the development were tested for validity by material experts and media experts, and tested for practicality by teachers and students. The results of validation by material experts was obtained 83% with very valid criteria, while the results of validation by media experts was obtained 95.6% with very valid criteria. The results of the validity of the e-plantbook were then tested for practicality by the teacher and 20 students which were obtained 91% and 82% with very good criteria. These results indicate that the e-plantbook is proven to be valid and practical as a source of student learning in SMA/MA.

Key words: Learning Resources, E-plantbook, Mobile Learning, Scientific

How to Cite: Maghfiroh, M. S., Rahayu, E. S., & Widiatningrum, T. (2022). Development of E-plantbook Learning Resources based on Mobile Learning Applications with a Scientific Approach. *ISET: International Conference on Science, Education and Technology* (2022), 755-763.

INTRODUCTION

Science and technology, particularly information and communication technology (ICT) in the world of education continues to grow. The advance in science and technology have varied the world of education in improving the quality, relevance and effectiveness of education (Istuningsih et al., 2018). The current technological advances provide students with cheap, fast, new, portable and digital access (Criollo-C et al., 2021). Therefore, the learning resources used in the learning must be ideal, attractive, easy to use, and in line with the demands of science and technology development (Oktaviani & Made Widiarta, 2019). Improving the quality of learning can facilitate students actively interact with the learning resources so that students can achieve learning goals effectively, efficiently and fun (Irawati & Ismaniati, 2019).

The results of the analysis and observation of the learning process at SMA Negeri 1 Kembang, Jepara Regency, Central Java Province stated that there was one book and one application for learning guidelines for X graders students as learning resources for achieving learning scores, including Student Worksheets and Quipper applications. However, by looking at the contents of the worksheets and the Quipper application, the achievement of the core competence was not maximally realized due to the absence of the data from observations and phenetic and phylogenetic analyzes of plants and the role of plants in survival on earth (particularly in the surrounding environment). In addition, the two learning resources have a few pictures of various types of plants (mosses, ferns and seeds), so the students cannot group plants into divisions based on their general characteristics. From these observations, it can be seen that the learning resources used in SMA Negeri 1 Kembang, Jepara Regency, Central Java Province are not yet ideal.

Thus, a solution was offered in the form of the learning resources availability of mobile learning application-based e-plantbook with a scientific approach which was expected to help teachers and students achieve KD Plantae material. Learning resources are one of the factors that can determine student learning outcomes (Lim & Morris, 2009), so that learning innovations must always be carried out (Hajar & In'am, 2017). E-plantbook as one of the learning innovations aims to make it easier for students to identify the minimal traits and characteristics of the division taxon, analyze the various benefits of plants for the survival of life and analyze the phenetics and phylogenetic of plants. This condition is expected

to improve students' critical thinking and scientific attitude. In addition, it can be studied independently so that students are able to construct their own knowledge (Wang et al., 2013).

E-plantbook is the name of a mobile learning application-based e-book which is developed as a product by using the application of ICT in learning. The learning resources advantages of mobile learning application-based e-plantbook with a scientific approach include all types of plants (mosses, ferns and seeds) located in the Kembang Nature Reserve, Jinggotan Village, Kembang District, Jepara Regency as a form of renewal in a research. Another advantage of the e-plantbook is that it contains material and plant visualizations that are easy for students to understand. Not only those advanteges, but also the e-plantbook contains color images/ photos presented based on the original version. In addition, the e-plantbook contains references so that it is easy to trace, more practical because it is enough to open a cellphone or laptop, and can be studied independently. E-plantbook can also be one of the ideal learning resources for students to achieve the Basic Competence of Plantae material.

One way to create meaningful learning is to impelement a scientific approach. The scientific approach is promoted as the main learning approach for all subjects in the 2013 Curriculum (Siti Nugraha & Suherdi, 2017). The scientific approach has an effect on understanding concepts because in its implementation, it involves process skills namely observing, classifying, measuring, predicting, explaining, and concluding (Tambunan, 2019). Based on this perception, the scientific approach generally consists of six key elements: 1) observing (identifying problems), 2) asking questions (and proposing hypotheses), 3) collecting data and information (performing experiments), 4) analyzing data (associating), 5) conclude, 6) communicate results, and 7) create (Susantini et al., 2016). The learning process that implements a scientific approach will touch three domains, namely: attitudes (affective), knowledge (cognitive), and skills (psychomotor) (Septiety & Wijayanti, 2020). The purpose of the scientific approach in learning is to improve students' thinking skills, establish problem solving abilities, train students in expressing opinions, improve student learning outcomes, and develop student character (Hosnan, 2014).

The purpose of this study is to develop a mobile learning application-based e-plantbook with a scientific approach to Plantae material. Therefore, it is hoped that it can enrich valid, practical and effective learning resources, particularly on Plantae material.

METHOD

This study uses Research and Development (R and D) with the research design used is the development of 4-D models (Four D Models). The 4-D development model consists of Define, Design, Develop, and Disseminate.

The define stage is useful for determining and defining needs in the learning process and collecting various information related to the product to be developed. This stage consists of literature & curriculum analysis, as well as field analysis. Literature & curriculum analysis was carried out based on observations at SMA Negeri 1 Kembang, Jepara Regency to analyze the needs of ideal learning resources on Plantae material. Field analysis was carried out by taking samples of mosses (Bryophyta), ferns (Pterydophyta) and seeds (Spermatophyta) using the Cruise Methods on the right and left on the paths Pal 2 to Pal 6 with purposive sampling technique in the Kembang Nature Reserve, Jinggotan Village, Kembang District, Jepara Regency.

The design stage has the following steps: 1) designing learning tools; 2) designing e-plantbook products; 3) develop product assessment instruments; and 4) make pretest and posttest questions. These step are carried out sequentially, starting from compiling learning tools and then making a mobile learning application-based e-plantbook design with a scientific approach.

The develop stage aims to produce an e-plantbook. The e-plantbook was tested for validity by material experts and media experts. Further revisions were made based on input from experts. Then a small-scale trial was conducted to determine the practicality of a mobile learning-based e-plantbook with a scientific approach according to the teacher's response and 20 students.

The disseminate stage was carried out by distributing a mobile learning-based e-plantbook that has been developed online through social media in the form of WhatsApp. The distribution was carried out at SMA Negeri 1 Kembang, Jepara Regency to X graders of Mathematics and Natural Sciences students and Biology subject teachers.

The data collection techniques used in this study were observation, interviews,

questionnaires, and documentation. The calculation of the level of validity of the e-plantbook used the following formula:

$$\boldsymbol{P} = \frac{\boldsymbol{\Sigma xi}}{\boldsymbol{\Sigma xj}} \text{ x } 100\%$$

Information:

P : Choice percentage

$\boldsymbol{\Sigma xi}$: Total score of expert assessment answers

$\boldsymbol{\Sigma xj}$: The highest number of answer scores

Table 1. E-plantbook validity assessment criteria

Percentage (%)	Validity Criteria
81.25 < P ≤100	Very valid
62.50 <P ≤ 81.25	Valid
43.73 < P ≤ 62.50	Not valid
25 <P ≤ 43.75	Invalid

While the calculation of student and teacher responses to the e-plantbook uses the following formula:

$$P = \frac{\boldsymbol{Total\ score}}{\boldsymbol{Maximum\ score}} \text{ x } 100\%$$

Table 2. E-plantbook Practical Criteria

Percentage (%)	Qualitative Category
80.1 < P ≤ 100	Very good
60.1 < P ≤ 80.1	Good
40.1 < P ≤ 60.1	Moderate
20.1 < P ≤ 40.1	Less
0.0 < P ≤ 20.1	Very less

RESULTS AND DISCUSSION

A Development of a Mobile Learning Application-based E-Plantbook with a Scientific Approach

The e-plantbook design that has been developed in the early part consists of: 1) cover, containing the title and the "start" button to view the menu on the application, designed with images related to interesting materials and colors; 2) title page, containing the e-plantbook menu and student evaluation results; 3) the preface contains thanks from the author, as well as; 4) basic competencies and learning objectives as benchmarks for learning to be achieved.

The main section begins with: 1) learning objectives in accordance with the core competencies to be achieved; 2) concept map; 3) learning stimulation in the form of videos; 4) description of learning materials; 4) unique information or facts about mosses, ferns and seed plants; 5) quiz at the end of each chapter, as well as; 6) reflection that contains the syntax of a scientific approach.

The cover contains; 1) the evaluation of the questions aims to determine the ability of students after finishing learning to use the e-plantbook; 2) downloadable student worksheets for group assignments; 3) a glossary containing a scientific dictionary/vocabulary to make it easier for students to find scientific understanding; 4) bibliography contains references used in making the e-plantbook, as well as; 5) author's biodata.

The developed e-plantbook is equipped with interesting and relevant pictures for everyday life (Oktafiani et al., 2021), equipped with video links, quizzes, student worksheets, and evaluation questions to determine student learning outcomes in cognitive aspects, affective and psychomotor. The application of discovery-based learning stimulates students to provide feedback on the learning process and improves students' cognitive skills (Alfieri et al., 2011).

Figure 1. E-plantbook Display

The characteristics of the mobile learning application-based e-plantbook developed with a scientific approach are as follows:

E-plantbook based on Core Competence

The e-plantbook begins with a cover chapter and learning outcomes include basic competencies and learning objectives. Basic competencies in line with Plantae material, 3.8. namely grouping plants into divisions based on general characteristics, and linking their roles in life; and Core Competences 4.8, which is to present reports on the results of observations and phenetic and phylogenetic analyzes of plants and their role in life. This is in line with Piskurich (2015) who argues that to achieve educational goals, the determination of basic competencies is important in learning design that serves to guide students when participating in learning activities (Budiastuti et al., 2021).

Learning objectives are indicators or student references to get the expected learning outcomes. This is in line with Daryanto (2015) which states that learning objectives are goals that describe the knowledge, abilities, skills, and attitudes that students must have from learning outcomes expressed in the form of behavior that can be observed and measured. The benefit of formulating learning objectives is that it makes it easier to communicate the intent of the learning activity process, so that students can learn independently. In addition, it makes it easier for teachers to select and compile teaching materials, determine the learning media to be used, and conduct assessments (Sukaharta et al., 2017).

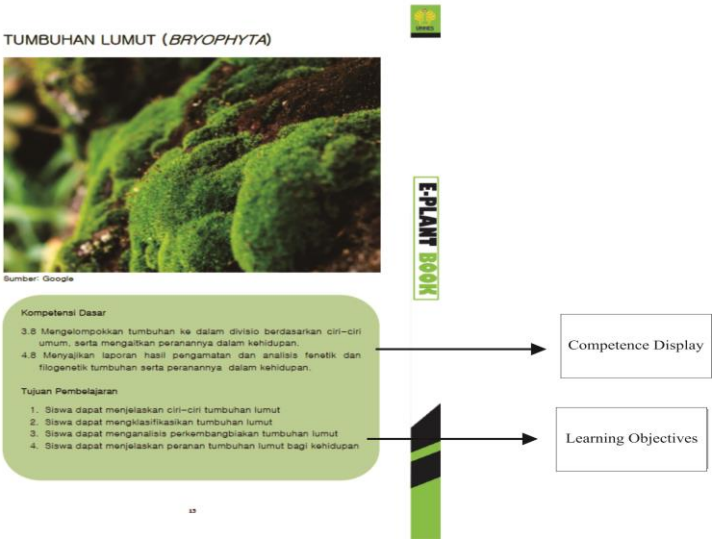

Figure 2. Core Competence Display and Learning Objectives on E-plantbook

E-plantbook was developed with a Scientific Approach

The material for the e-plantbook is in line with the Basic Competencies of the Plantae material. The selection of the e-plantbook material was adjusted to the environmental conditions in the Kembang Nature Reserve, Jinggotan Village, Kembang District, Jepara Regency.

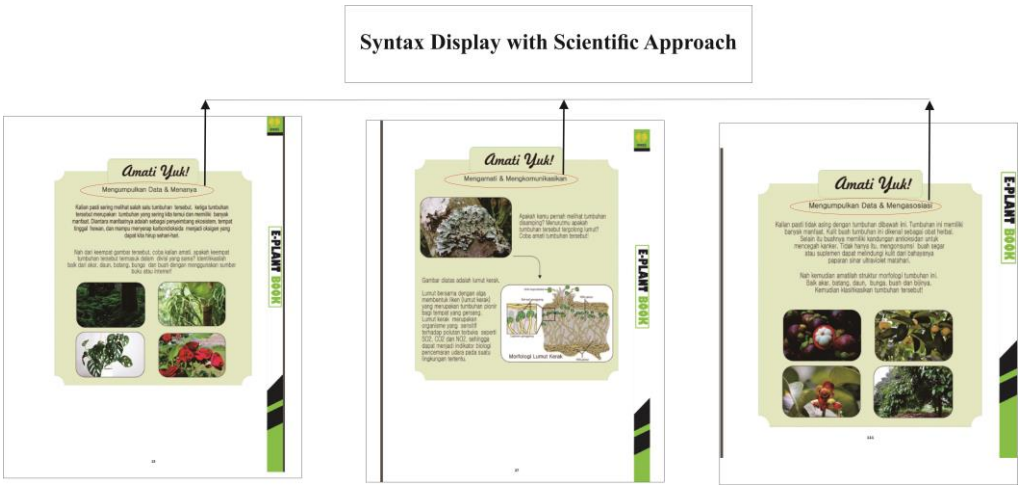

Figure 3. E-plantbook Syntax Display with Scientific Approach on E-plantbook

According to Fauziah (2013) the scientific approach invites students to directly infer existing problems in the form of problem formulations and hypotheses, a sense of care for the environment, curiosity and love of reading. In practice, students will have the opportunity to conduct investigations and inquiries as well as develop and present their work (Machin, 2014). This is in line with Michael & Richard (2006) which states that teaching must involve students to work together in groups so that students do not only depend on the teacher as the main source of information in education.

The scientific approach is important to use in learning because it can develop various skills namely critical thinking skills, communication skills, research and collaboration skills and character behavior, because the learning experience provided can fulfill educational goals and are useful in solving real-life problems (Liana, 2020).

E-plantbook is equipped with Interesting Knowledge and Quiz

The developed e-plantbook does not only contain material descriptions. However, it is equipped with interesting knowledge and unique facts related to Plantae material. The goal is to add knowledge, current information and broaden horizons. Interesting knowledge is equipped to explain the misconceptions that often occur in Plantae material. The quiz at the end of each chapter aims to test students' abilities in evaluating the learning that has been taught.

The development of learning resources requires evaluation to determine the quality of these learning resources. Evaluation of learning resources can be based on criteria; 1) economical, 2) practical and simple, 3) easy, 4) flexible, and 5) aligned with instructional goals (Rohani, 2014).

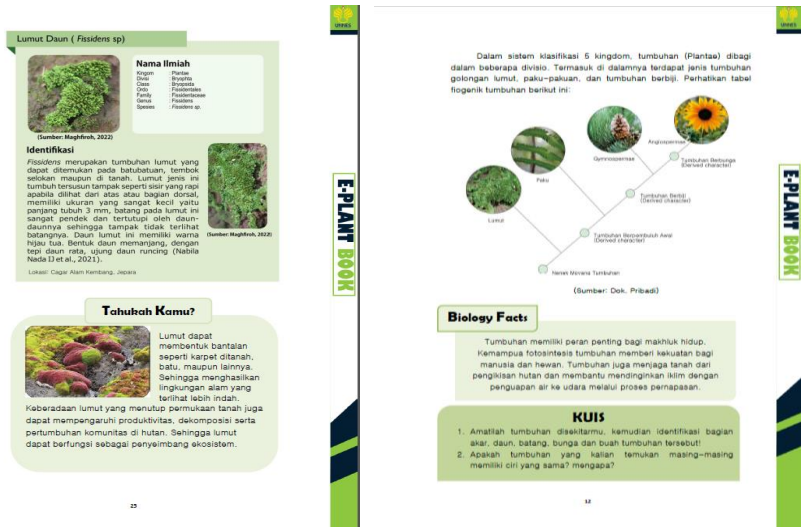

Figure 4. Interesting Knowledge Display and Quiz on E-plantbook

E-plantbook is Equipped with a Video Link Connected to Youtube as a Learning Stimulus

The developed e-plantbook contains a video link that is connected to Youtube as a learning stimulus and innovation, so that the E-plantbook is more interesting when used in the process of learning activities with teachers or independently. In addition, it can be used as additional visual knowledge for students, making it easier to understand learning materials, particularly Plantae material.

Figure 5. Video Link Display on E-plantbook

The validity of mobile learning application-based the e-plantbook with a scientific approach

Material Expert Validation

The validity of the e-plantbook is based on the assessment of the material expert validator. The material expert validator has 4 aspects of assessment consisting of aspects of content feasibility, presentation feasibility, language and scientific feasibility. The content feasibility aspect is used to determine the suitability of the e-plantbook with Core Competence and the learning objectives to be achieved. The feasibility aspect of the presentation is used to determine the coherence and coherence of the presentation of the e-plantbook. The language feasibility aspect is used to determine the suitability of the language rules in the e-plantbook which is communicative and easy to understand, and the scientific aspect is used to improve students' scientific attitudes.

Setelah dilakukan revisi/perbaikan oleh para ahli, hasil rekapitulasi penilaian *e-plantbook* oleh validator ahli materi memperoleh rata-rata 83% dengan kriteria sangat valid digunakan dalam pembelajaran di Sekolah. Hasil validasi ahli materi dapat dilihat pada Tabel 3. After revisions/improvements were made by experts, the results of the recapitulation of the e-plantbook assessment by material expert validators obtained an average of 83% with very valid criteria used in learning in schools. The results of material expert validation can be seen in Table 3.

Table 3. E-plantbook Validation Results by Material Expert

No	Aspect	Score	Percentage (%)	Criteria
1	Content Eligibility	40	83	Very Worthy
2	Presentation Eligibility	30	83	Very Worthy
3	Language Eligibility	30	83	Very Worthy
3	Scientific	23	82	Very Worthy
Average		123	83	Very Worthy

The scoring is based on the assessment of the e-plantbook on the suitability of the material with Core Competence and learning objectives, accuracy of the material, up-to-date material, lesson support materials, presentation of learning, coherence and coherence of thinking, straightforwardness, communicative, dialogical & interactive, conformity with student development, conformity with language rules, and in accordance with the nature of science and scientific components.

Media Expert Validation

The media expert validator's assessment consists of 3 aspects, including graphic feasibility, e-plantbook component, and language feasibility. Graphical feasibility is used to determine the suitability of the e-plantbook format with ISO standards, the e-plantbook component is to describe the contents/materials and reveal the character of objects, and the appropriateness of language is used to determine the suitability of the content.

There were suggestions from media experts who then revised the e-plantbook to produce better and valid learning resources. The results of the media expert's assessment obtained 95.6% with very valid criteria which can be seen in Table 4.

Table 4. E-plantbook Validation Results by Media Experts

No	Aspect	Score	Percentage (%)	Criteria
1	Graphic Eligibility	20	100	Very Worthy
2	E-plantbook Components	33	91.7	Very Worthy
3	Language Eligibility	12	100	Very Worthy
Average		65	95.6	Very Worthy

The media expert's assessment is based on the cover design of the e-plantbook used, the design that can represent the contents in the e-plantbook, straightforwardness, communicativeness, the use of terms and the graphic of the e-plantbook developed as a learning medium. This is in line with the opinion of Arikunto (2013), which states that if the feasibility of teaching media gets a score above 80%, it has very valid qualifications and does not need revision so that the e-plantbook is valid to be used in the learning process.

The process of developing an e-Plantbook so that it is valid to be used as a learning resource in learning activities in schools on Plantae material must be validated first by material experts and media experts. This is in line with Akbar (2013), stating that validation is carried out as an effort to produce teaching material products based on development theory and ensure their validity for use in the learning process.

According to Sugiyono (2016), there are two kinds of validity, namely internal and external validity. Internal validity includes content validity and construct validity which states that the research design is correct and the research results can be trusted. While external validity is the result of research that can be applied to the real world/has a place to be studied. The activity of validating and conducting product testing is an activity or activity that determines the quality of a research (Basaroh et al., 2021). In this study, construct validity was used by material experts and media experts.

The assessment indicators of material experts and media experts on the e-plantbook are in line with the Ministry of National Education (2008) which states that the assessment criteria by experts on the development of teaching materials include the content, presentation, and linguistic feasibility sections must be valid before being used in the next stage of the test.

The practicality of a mobile learning application-based e-plantbook with a scientific approach

The practicality of the e-plantbook was piloted on a small scale with 20 students and a biology teacher. Aspects of teacher and student response assessment include aspects of language, sentence

structure, image presentation, and the practicality of the e-plantbook which can be seen in Table 5.

If the average reading response results and the practicality of teachers and students are combined, the score is 87% with very good criteria. It can be concluded that the e-plantbook can meet the specified indicators as the basis for the assessment because it has very good criteria.

Table 5. Results of E-plantbook Readability and Practicality Assessment

No	Aspect	Teacher		Student	
		Percentage (%)	Information	Percentage (%)	Information
1	Language	90	Very Good	84	Very Good
2	Sentence Structure	93	Very Good	83	Very Good
3	Image Presentation	90	Very Good	90	Very Good
4	Practicality of E-plantbook	93	Very Good	87	Very Good
Average		91	Very Good	82	Very Good

Practical aspects include the use of language that is easy to understand, sentence structure, consistent use of sentences, presentation of images and the shape and size of letters. While the practical aspects of e-plantbook include ease of access because it is digital, e-plantbook design, communicative and scientific.

The results of the teacher's response to the e-plantbook which was developed as a learning resource were well received. This helps teachers in the process of learning Plantae material easily. Learning activities using e-Plantbook is a novelty or innovation in education that can improve students' knowledge, curiosity and scientific attitude, so that they can be used as reference material for Plantae material, and help students to be able to study independently or in groups. This is in accordance with the opinion of the Ministry of National Education (2008) that module development can answer or solve problems, as well as learning difficulties.

The learning tools developed can be said to be practical if they are easy and can be implemented in learning (Plomp & Nieveen, 2013). According to Alfiriani (2018), practicality refers to the ease of use of products developed so that the learning carried out can be meaningful, interesting, fun and useful for life as well as increase creativity and have a degree of effectiveness on learning outcomes.

CONCLUSION

The e-plantbook is considered very valid by material experts with a score of 83% and by media experts it is considered very valid with a score of 95.6%. The e-plantbook was assessed as practical by the responses of biology subject teachers and students through a small-scale trial, each obtaining 91% and 82% results with an average final result of 87% which showed the e-plantbook had very good criteria. These results indicate that the e-plantbook is proven to be valid and practical as a source of student learning in SMA/MA.

ACKNOWLEDGEMENT

This journal article was written based on research results funded by the DIPA FUND of Universitas Negeri Semarang through the 2022 Student Research Program (Postgraduate). The contents are entirely being the responsibility of the author.

REFERENCES

Akbar, S. (2013). *Instrumen Perangkat PembelajaranNo Title*. PT Remaja Rosdakarya Offset.

Alfieri, L., Brooks, P. J., Aldrich, N. J., & Tenenbaum, H. R. (2011). Does Discovery-Based Instruction Enhance Learning? *Journal of Educational Psychology*, *103*(1), 1–18. https://doi.org/10.1037/a0021017

Alfiriani, A. (2018). *Article · August 2018*. *August*.

Arikunto, S. (2013). *Prosedur Penelitian Suatu Pendekatan Praktik*. Jakarta: Rineka Cipta.

Basaroh, A. S., Al Muhdhar, M. H. I., Prasetyo, T. I., Sumberartha, I. W., Mardiyanti, L., & Fanani, Z. (2021). Pengembangan E-Modul Model Eksperiental Jelajah Alam Sekitar (Ejas) Pada Materi Plantae. *Jurnal Pendidikan Biologi*, *12*(1), 30. https://doi.org/10.17977/um052v12i1p30-39

Budiastuti, P., Soenarto, S., Muchlas, M., & Ramndani, H. W. (2021). Analisis Tujuan Pembelajaran Dengan Kompetensi Dasar Pada Rencana Pelaksanaan Pembelajaran Dasar Listrik Dan Elektronika Di Sekolah Menengah Kejuruan. *Jurnal Edukasi Elektro*, *5*(1), 39–48. https://doi.org/10.21831/jee.v5i1.37776

Criollo-C, S., Moscoso-Zea, O., Guerrero-Arias,

A., Jaramillo-Alcazar, A., & Lujan-Mora, S. (2021). Mobile Learning as the Key to Higher Education Innovation: A Systematic Mapping. *IEEE Access*, *9*, 66462–66476. https://doi.org/10.1109/ACCESS.2021.3076148

Daryanto. (2015). *Media pembelajaran*. Gava Media.

Hajar, S., & In'am, A. (2017). Learning Geometry through Discovery Learning Using a Scientific Approach. *International Journal of Instruction*, *10*(1), 55–70.

Hosnan, M. (2014). *Pendekatan Saintifik dan Kontekstual dalam Pembelajaran Abad 21*. Ghalia Indonesia.

Irawati, E., & Ismaniati, C. (2019). GI Assisted Go: An Innovative Learning Model to Improve Students Creative Thinking Ability. *KnE Social Sciences*, *3*(10), 113. https://doi.org/10.18502/kss.v3i10.3893

Istuningsih, W., Baedhowi, B., & Bayu Sangka, K. (2018). The Effectiveness of Scientific Approach Using E-Module Based on Learning Cycle 7E to Improve Students' Learning Outcome. *International Journal of Educational Research Review*, *3*(3), 75–85. https://doi.org/10.24331/ijere.449313

Liana, D. (2020). Berpikir Kritis Melalui Pendekatan Saintifik. *MITRA PGMI: Jurnal Kependidikan MI*, *6*(1), 15–27. https://doi.org/10.46963/mpgmi.v6i1.92

Lim, D. H., & Morris, M. L. (2009). Learner and instructional factors influencing learning outcomes within a blended learning environment. *Educational Technology and Society*, *12*(4), 282–293.

Machin, A. (2014). Implementasi pendekatan saintifik, penanaman karakter dan konservasi pada pembelajaran materi pertumbuhan. *Jurnal Pendidikan IPA Indonesia*, *3*(1), 28–35. https://doi.org/10.15294/jpii.v3i1.2898

Michael, J. P., & Richard, M. F. (2006). To state a theorem and then to show examples of it is literally to teach backwards. *Learning*, *95*(2), 123–138. http://mate.calpoly.edu/media/files/Review_inductive_learning.pdf

Oktafiani, R., Retnoningsih, A., Widiatiningrum, T., Ipa, P. P., Semarang, U. N., Matematika, F., Alam, P., & Semarang, U. N. (2022). Pengembangan E-Book Interaktif Tumbuhan Berbiji dengan Pendekatan Saintifik dan Kontekstual. *Bioeduca : Journal of Biology Education*, *4*, 67–83.

Oktafiani, R., Widiatningrum, T., & ... (2021). The Effectiveness of Using Interactive E-Books of Spending Plant Through Online Learning. *Journal of Innovative …*, *10*(37), 244–250. https://journal.unnes.ac.id/sju/index.php/jise/article/view/43923

Oktaviani, N., & Made Widiarta, I. (2019). Pada Smp Negeri 1 Buer. *Jurnal JINTEKS*, *1*(2), 160–168.

Plomp, T., & Nieveen, N. (2013). Educational Design Research Educational Design Research. *Netherlands Institute for Curriculum Development: SLO*, 1–206. http://www.eric.ed.gov/ERICWebPortal/recordDetail?accno=EJ815766

Rohani, A. (2014). *Media Instruksional Edukatif*. Jakarta: PT Rineka Cipta.

Septiety, D. D. W. I., & Wijayanti, R. (2020). Implementasi Pendekatan Saintifik Guru Biologi SMA di Boyolali Implementation of Scientific Approach by Biological Teachers in Boyolali. *Jurnal Pendidikan Biologi*, *13*(1), 1–8.

Siti Nugraha, I., & Suherdi, D. (2017). Scientific Approach: an English Learning-Teaching (Elt) Approach in the 2013 Curriculum. *Journal of English and Education*, *5*(2), 112–119. http://ejournal.upi.edu/index.php/L-E/article/view/9941

Sugiyono. (2016). *Metode Penelitian Pendidikan Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta.

Sukaharta, K. B., Santiyadnya, N., & Nurhayata, I. G. (2017). Studi Evaluasi Proses Pembelajaran Prakarya Dan. *Jurnal Pendidikan Teknik Elektro Undiksha*, *6*(2), 57–65.

Tambunan, H. (2019). The Effectiveness of the Problem Solving Strategy and the Scientific Approach to Students' Mathematical Capabilities in High Order Thinking Skills. *International Electronic Journal of Mathematics Education*, *14*(2), 293–302. https://doi.org/10.29333/iejme/5715

Wang, L., Zeng, Z., Li, R., & Pang, H. (2013). Cross-domain personalized learning resources recommendation method. *Mathematical Problems in Engineering*, *2013*. https://doi.org/10.1155/2013/958785