Development of Plant Tissue Module Based on Blended Learning as High School Teaching Material

Raras Widiasri Putri ✉[1], Amin Retnoningsih [2], Talitha Widiatningrum [2]

[1] SMP IT Amal Insani Jepara, Indonesia
[2] Pascasarjana, Universitas Negeri Semarang, Indonesia

Article Info	Abstract
	Plant tissue competence is to analyze the relationship between structure and function of plant tissue. This study aims to test the validity and effectiveness of the plant tissue module based on blended learning. The research method uses research and development (R & D) which consists of research, development, validation, and field-testing. The research was conducted on learning constraints, teaching materials, and learning materials (plant tissues). Modules are developed from the results of research which are then validated and legibility tests. The field test was conducted at SMA N 1 Jepara by taking 3 classes as a control class (without modules), experiment 1 (using modules), and experiment 2 (using blended learning modules). The results of the characteristics of the blended learning module of plant tissue are images and videos in the module derived from the results of research on plant tissue of xerophytes, mesophytes (monocots and dicots), and hydrophytes in the organs of leaves, stems and roots which are presented along with tissue information to facilitate analysis by comparing between tissue. The results of module validation by teaching materials experts are 97% and learning materials experts are 100% with very valid criteria, and module readability validation is 90% with easy to understand criteria. The results of the effectiveness of the module in the cognitive aspects of the experimental class 2 were higher than the control class and experimental class 1, which was 90,90% with very effective criteria. Classical mastery of the psychomotor and affective aspects of the experimental class 2 by 100% with very effective criteria.

✉ correspondence :
SMP IT Amal Insani Jepara, Indonesia
Jl. RMP Sosro Kartono RT 02/01, Bapangan, Jepara, Jawa Tengah,
Indonesia 59413
E-mail: raraswidiasri@gmail.com

INTRODUCTION

Basic competencies (KD) that will be achieved in learning plant tissue material include cognitive, psychomotor, and affective aspects. In order to achieve KD, students need to understand the material, be skilled at making preparations, be able to carry out the process of identification and tissue analysis. Material that is well understood can facilitate the process of identification and tissue analysis. The ability to identify and analyze tissues is also determined by the skills in making preparations, including the skills in presenting data from tissue observations. Psychomotor aspects correlate with cognitive aspects. Arpan's research results (2016) showed that students' low psychomotor abilities would reduce their cognitive abilities.

The results of observations at 6 SMA in Jepara district showed that the learning process of plant tissue material was carried out by discussion and practicum. Practical activities use preparations made by students whose incisions are still too thick, making it difficult to use a microscope. In addition, preserved preparations are also used to anticipate the weaknesses of homemade preparations so that the practicum time is more efficient. Some of the teacher's time is also consumed to explain how the practicum works so that the time for practicum activities is reduced. Some schools request teachers to prepare laboratory equipment because they do not have special laboratory staff. Microscopes are not routinely maintained so that many are damaged. Students are divided into groups with a maximum number of 5 students. Indicators of psychomotor aspects are not optimal because 1) inadequate laboratory facilities and infrastructure, 2) limited practicum time, and 3) unsatisfactory preparation skills.

The number of obstacles in the implementation of the practicum reduces the ability to identify the tissue of observation results and reduces the ability to analyze the linkages of tissue structure and function. Identification of the tissue from the observation is done by comparing photos from the observation of tissue with images in the teaching materials. Teaching materials are generally in the form of textbooks in which there are many pictures. The tissue image is in the form of observations through an electron microscope and an illustration image. Observation of tissue by students was carried out with a light microscope so that the tissue was difficult to identify. Analysis of the relationship between structure and function of the tissue is also less than optimal because theoretical knowledge has not been linked to practicum skills in the form of observations. The average daily test results of the material are also below the minimum completeness criteria (KKM).

Efficiency and effectiveness of learning plant tissues need to be improved so that basic competencies in cognitive, psychomotor and affective aspects can be achieved. One of effort that can be done is to use teaching materials to help students understand the material and do practicum. Module is one of the teaching materials that can be used to achieve these basic competencies. The modules are arranged systematically with instructions for use so that they are easy to become independent study guides (Depdiknas, 2008). The advantage of using modules is that they are easy to use for discussion, observation, and problem solving so that they are able to direct students to explain, analyze, and conclude material (Zubail et al., 2018).

Teaching materials are required to keep up with the times by utilizing information technology (IT). This module can be designed offline and online so that students can use it independently, anytime, and anywhere (Lestari et al., 2016). The use of blended learning module is expected to make it easier for students to analyze the linkage of tissue structures and functions and to become a reference for independent practicum activities assisted by worksheets and videos of making preparations.

The purpose of this study was to test the validity and effectiveness of using the blended learning module in plant tissue material. The module is expected to help students achieve basic competency in cognitive, psychomotor, and affective aspects which can be seen in the learning outcomes of this material.

METHODS

The development of the blended learning module is carried out through the research and development (R&D) method using the Sugiyono model (2010). This research consists of several stages, including research, development, validation and field-testing. The research stage includes the

identification of learning constraints and teaching materials used in schools, as well as observation of plant tissue of xerophytes, mesophytes (monocots and dicots) and hydrophytes in the organs of leaves, stems and roots.

The module development stage includes plant tissue material, images, videos of tissue observation results, and videos of making preparations. This module was developed offline (print) and online (blog) containing videos that are integrated with the YouTube channel. The blog address is listed on the print module to make it easier for students to access.

The validation stage is carried out to test the validation and readability of the module. The field-testing stage is carried out to test the effectiveness of the module on a large-scale test using 3 classes, namely 1) the control class uses textbooks without modules, 2) the experimental class 1 uses textbooks and modules, and 3) the experimental class 2 uses textbooks and modules blended learning. The effectiveness assessment is carried out on the cognitive, psychomotor, and affective aspects. The data collection technique is shown in Table 1.

Table 1. Data Collection Techniques

Type of data	Data collection technique	Instrument
Research Phase		
Learning constraints and teaching materials	Interviews and documentation	List of interview questions
Plant tissue	Tissue identification and documentation	Plant tissue identification sheet
Validation Phase		
Module validation	Questionnaire validation of teaching materials and learning materials	Validation sheet of teaching materials and learning materials
		Readability validation sheet
Validate the readability of the module	Module readability questionnaire	
Field-testing Phase		
Cognitive abilities	Test	Multiple choice and descriptions
Psychomotor abilities	Observation and documentation	Psychomotor assessment sheet
The affective abilities	Observation	Affective assessment sheet

RESULTS AND DISCUSSION

The results of study consisted of 1) the analysis of the obstacles of learning and teaching materials plant tissues, 2) the characteristics of the module blended learning, 3) the results of the validation of teaching materials, learning materials, and legibility modules blended learning, and 4) the results of the effectiveness of the module blended learning (cognitive, psychomotor, and affective).

Learning Constraints and Plant Tissue Teaching Materials

Interviews were conducted with biology teachers at SMA Negeri 1 Jepara, SMA Negeri 1 Tahunan, SMA Negeri 1 Mlonggo, SMA PGRI Jepara, SMA Islam Jepara, and SMA Muhammadiyah Jepara. The constraints faced in the learning process are mainly limited laboratory facilities and infrastructure, time, and teacher guidance during practicum. The limited and untreated number of microscopes resulted in the malfunction of the device. In addition, all biology teachers at the school must participate in preparing the practicum because there are no laboratory staff. The teacher also needs to explain how it works before starting practicum. Due to limited time and facilities, teachers cannot fully assist students, especially when making tissue preparations so that almost 60% of students are not skilled at making thin slices.

The results of thick incisions are difficult to observe with a microscope, so that students find it difficult to analyze the relationship between tissue structure and function. The anatomy of plant tissues is difficult to observe and differentiate from one another. Students cannot identify the types of tissue directly on the preparations. As a result, students

are unable to determine the important features of each of these plant tissues and in the end, it is difficult to analyze the relationship between the structure and function of plant tissues (Puspitasari et al., 2019). The low understanding of plant tissue material causes the average evaluation results on daily tests in all schools to be still below the KKM 75.

The teaching material used in the school studied was the 2013 curriculum package book from the government. Information related to material obtained by students is limited because it only relies on textbooks. The tissue images contained in the textbook contain no information on the name of the plant being observed, the microscope magnification, and some of the images are in the form of illustrations. These images cannot be used as a comparison to the tissue observation results during the lab work because of the different appearance of the tissue.

Information and communication technology (ICT) infrastructure provided by all schools is adequate for developing innovative ICT based learning. Each class provides internet access, PC computers, and LCDs. ICT facilities and infrastructure can be used to overcome learning constraints and teaching materials. Biology teachers at the school also have the ability to make ICT based teaching materials. The problems of students during plant tissue practicum can be overcome through the use of these ICT facilities and infrastructure. Teachers can develop informative video instructional media to overcome time and technical constraints in making preparations. The video contains technical explanations and steps on how to make preparations. The advantage of video is that it can be played back according to the needs of students and seen at any time.

In addition to textbooks, blended learning modules as supporting teaching materials need to be developed because this media is proven to save learning time and can be used to study independently without being assisted by teacher (Nihayah et al., 2018; Inggriyani et al., 2019). The blended learning module contains a print module (offline) and a video blog (online) on how to make preparations that can be accessed via the internet. The printed module emphasizes the delivery of material and images of the observed tissue, while the video emphasizes the skills of making

preparations and seeing the complete cross-section of the tissue.

Characteristics of Blended Learning based Plant Tissue Modules

The images and videos provided in the blended learning module are taken from observations using a light microscope. The image and video quality of the light microscope observations are the characteristics of the blended learning based plant tissue module. Tissue images and videos are displayed the same as the results observed during the practicum. The tissue used in the module is taken from 3 main plant organs, namely the leaves, stems and roots of each of the 3 types of plants, namely xerophyte, mesophyte (monocyte and dicot), and hydrophyte. Indicator KD students can analyze the linkage of tissue structure and function can be achieved and can present the results of tissue observations.

Observation of tissue from various types of plants makes it easier for students to compare the tissues in each organ. Each type of plant chosen two types of plants so that learners are able to view the tissue equations on the same plant type and is able to see the difference between different types of plants.

The plants observed were selected from plant types that were recognized and known by students so that the characteristics of the plants were easy to understand. Complete plant drawings from leaves to roots are also included in the module. The type of xerophyte (plants that live in dry environments) that chosen were cactus (*Cereus tetragonus*) and lidah mertua (*Sansevieria sp.*). The monocot mesophyte type (single seed plant that grows in a sufficiently watery environment) that chosen were adam hawa plants (*Rhoeo discolor*) and gelombang cinta (*Anthurium ploumanii*). The mesophytic type of dicot (double seeded plant that grows in a sufficiently watery environment) that chosen were kamboja jepang (*Adenium obesum*) and jasmine (*Jasminum sambac*). The hydrophyte type (plants that live in a watery environment) that chosen were eceng gondok (*Eichhornia crassipes*) and water jasmine (*Echinodorus palaefolis*).

The type of microscope used is the same as the microscope used during practicum, which is a light microscope so that the results obtained by students are the same as those shown in the

module. The magnification of the microscope used is 100x and 400x. The image of the observation results is clear so that students can determine the important features of the tissue from each preparation.

The module is equipped with a general description of plants whose tissue was observed, namely 1) the scientific name, 2) area name, 3) drawing plant intact covering the roots, stems and leaves, and 4) the habitat of these plants to facilitate early learners get and see directly to the plant. The tissue image is accompanied by a description of the type of microscope used, magnification, type of incision, observed plant organ, and plant name. Every plant organs were given an explanation of the characteristics of the tissue and tissue cross-section presented some images to give a lot of reference for learners.

The results of the observations are presented in a video that describes the cross-section of the tissue so that students can observe the complete and complete tissue from outside to inside in each plant organ. The video includes descriptions of native plant images, plant names, plant organs, and microscope magnification. In addition, how to

make preparations is also presented in the video. The technical video of making preparations makes it easy for students to imitate the correct way of making preparations and make their own practical work . The video can be accessed by students according to the blog address available in the print module or via the youtube channel link found on the blog. The presentation of material accompanied by pictures and videos can attract the attention of students because it is more varied, thereby strengthening understanding (Purnomo et al., 2016; Prayitno, et al., 2017).

Validation of Blended Learning based Plant Tissue Modules

Module validation is carried out by teaching materials experts and material experts. The blended learning based plant tissue module has an average of 97% validation of teaching materials including very valid criteria and 100 % validation of learning material with very valid criteria. The results of the validation of teaching materials and learning materials are shown in Table 2 with an average of 99.25%.

Table 2. Expert Validation of Teaching Materials and Learning Materials

Expert	Aspects arerated	Percentage (%)	Criteria
Teaching materias	Presentation technique	100	Very valid
	Serving support	96	Very valid
	Cover design	95	Very valid
	Content design	100	Very valid
Learning materials	Material suitability	100	Very valid
	Material accuracy	100	Very valid
	Supporting material	100	Very valid
	Compatibility of understanding	100	Very valid
	Communicative	100	Very valid
	Language suitability	100	Very valid
	The concatenation and unity of the image	100	Very valid
	Use of terms	100	Very valid
Average		99.25	Very valid

Module validation by teaching material experts includes 4 aspects of assessment, namely 1) presentation technique, 2) presentation support, 3) cover design, and 4) content design. The results of the validation of the module developed are very valid in terms of teaching materials, but there are still revisions to the cover design and presentation support. The name of the composer on the module cover is not clear, the name of the editor is too

small, and the description of the image should be written in full with the name of the plant.

Validation module by subject matter experts covering aspects of assessment, namely 1) the suitability of the material, 2) material accuracy, 3) supporting material, 4) the suitability of understanding, 5) communicative, 6) the suitability of the language, 7) the coarseness and unity of the image, and 8) the use of terms which all aspects

indicate is very valid. Suggestions for improvement are given for the use of some terms that misunderstanding on learners. Repairs were made in the term of the supervisor changed to editor, adult tissue was changed to non-meristematic tissue, and immature plastids were replaced with immature plasmas. In addition, the caption of the tissue image is accompanied by a cross-sectional description of the plant organs shown, and an example of a cross-sectional view of the monocot root in the gelombang cinta.

Validation of module readability was carried out on a small scale by 12 students of class XI MIA who were not part of the large-scale test group. Questionnaire legibility module that is used as an assessment tool provides display module, the presentation of the material, image presentation, and the response of learners. The validation results show an average value of 90% which includes easy to understand criteria.

Display modules and tissue images presented according to learners are interesting because the images are selected from observations, are colored, and are accompanied by clear image descriptions.

The presentation of the module is equipped with pictures related to the material to strengthen the research results (Habsari et al., 2016) making it easier for students to understand the material. In addition to images, video is an important component that complements the explanation of plant tissue material. The addition of pictures and videos to this module attracts the attention of students, causing learning motivation to increase as the research results of Elmovriani et al. (2016) and Wijayanti et al. (2016).

The Effectiveness of the Blended Learning based Plant Tissue Module

Effectiveness module measured from the learning aspect of the cognitive, psychomotor, and affective. The large-scale test was conducted using 3 classes at SMA Negeri 1 Jepara consisting of 1 control class (without modules), 1 experimental class 1 (using modules), and 1 experimental class 2 (using blended learning modules). KKM used was 75. The results of study on cognitive aspects obtained from the pretest and posttest results which are presented in Table 3.

Table 3. Cognitive Learning Outcomes

Class	Average		Classical	Criteria
	Pretest	Post test	Completeness	
Control	59.09	75	60.60	Effective
Ex-1	64.24	80.30	84.84	Very effective
Ex-2	65.6	83.48	90.90	Very effective

The effectiveness of learning towards KKM shows that the experimental class 2 achieves the highest completeness and is considered very effective. KKM control class, the lowest compared to other treatments. This class uses textbooks that contain fairly complete material but the cognitive learning outcomes are under the KKM.

The images presented in the textbook come from various sources, including observations with light microscopes, electron microscopes, and only illustrative images. The information on the name of the tissue in the image is not accompanied by a description of the origin of the tissue, type of plant, type of microscope, and its magnification. Students find it difficult to identify the tissue from the results of the practicum because it is different from the comparison picture in the textbook and incomplete picture captions.

Another possibility, the students' observations are colorless, while in the colored picture package book students find it difficult to distinguish between tissues because the tissues look the same. This difficulty in identifying hinders the ability to understand the relationship between structure and function of the tissue. Students finally only memorize the location of the tissue making up the organs without being compared with the results of observations during practicum, this can lead to errors in interpreting information (Istighfarin, 2015).

The textbook is equipped with student worksheets for practicum. Student worksheets contain titles, objectives, tools, materials, and work methods, but in practice there are still many students who do not understand the practical work. Teachers need to explain the workings of the lab so that the time scheduled for lab wasted.

Students in the control class answer questions on student worksheets using the information in the textbook, not based on observations during practicum. This limitation makes students less confident about the results of their observations and hinders the ability to do analysis (Lestari et al., 2016).

The results of the trials in the experimental class 1 and 2 are the same, both are in the very effective category, but the experimental class 1 has classical completeness of 84,84% and the experimental class 2 is 90,90%. Experiment class 1 uses a printed module which has the advantage of being able to learn independently and does not need to use internet access. Experiment class 2 uses a blended learning module which has the advantage that it can be used for independent learning, can be used anytime, and is equipped with videos.

In the experimental class 1, the student worksheet, the tools, materials, and work methods of students are asked to fill in by themselves by searching on the internet. Whereas in the experimental class 2 students used the blended learning module containing the same as the plant tissue module, but on the student worksheets the parts for tools, materials, which were left blank, students filled it out by watching a video how to make preparations whose blog address would be included in the module. Students learn independently by watching videos to optimize practicum time for observations. In addition to videos on how to make preparations, there are also video cross-sections of tissue that help students to observe more detail so that it helps improve understanding of the material (Purnomo et al., 2016). Modules are presented with additional multimedia so that they can observe the tissue more thoroughly and students are more enthusiastic about learning. Multimedia helps students understand the concept of the relationship between the structure and function of plant tissue (Rosmalina et al., 2016).

The blended learning module helps students analyze material accompanied by pictures and videos of observations. This helps students achieve learning competencies with better results than the control class and experimental class 1 so that they can improve learning outcomes in the cognitive aspects (Purnomo et al., 2016). The blended learning-based plant tissue module is made based

on KD 3.3, which is to analyze the relationship between cell structure and the function of plant organs based on observations. The development of teaching materials is carried out in accordance with the 2013 curriculum which includes cognitive, psychomotor, and affective aspects, so as to improve learning outcomes (Depdiknas, 2008).

Psychomotor aspects of plant tissue material refer to KD 4.3, namely presenting the anatomical structure data of plant tissue based on observations. All research classes carried out a plant tissue observation practicum. Each class is divided into 6 groups and each group brings the materials needed.

Psychomotor assessment was carried out by observing the observer during the practicum. The aspects that are assessed are the skills of making preparations, using microscopes, and classifying. The psychomotor learning outcomes of the three classes can be seen in Table 4 below.

Table 4. Psychomotor Learning Outcomes

Class	Average	Classical Completeness (%)	Efficacy Criteria
Control	91	100	Very effective
Ex-1	93	100	Very effective
Ex-2	96	100	Very effective

Participants learners there are all the classes as a whole are actively involved in the lab, so the results of psychomotor shows all incoming class of highly effective criteria. The practicum implementation is assisted by student worksheets, where the worksheets in the experimental class 1 and experiment class 2 are left blank so that students before carrying out the practicum can find information about how the practicum will be carried out and train the creativity of students in drafting.

The control class has a lower average score than the other 2 classes. If there is an assessment of making preparations, students understand for themselves how the work is on the student worksheets, even though at the beginning of the practicum the teacher has demonstrated how to work but due to time constraints and guidance from the teacher makes the results less than optimal. Making preparations that are less thin causes the tissue to be difficult to observe because the cells are still accumulated and a lot of practicum time is spent to make preparations.

The experimental class 1 average value is lower than the experimental class 2, namely in the aspect of making preparations. This happens because students have difficulty equating the workings of one group with another. The experimental class 2 has a better average score than the control class and the experimental class 1. The student worksheets used guide students in making work methods using language that they can easily understand by watching videos contained on the blog. This can overcome the limitations of teacher guidance when practicum and time for practicum are more optimal for group observation and discussion. Modules that are accompanied by pictures and videos make it easier for students to learn independently, both cognitively and psychomotor so that they save more time (Sutisna, 2016).

The aspect of classifying the tissue from the observation results in the control class was lower than the experimental class 1 and the experimental class 2. The students had difficulty classifying the tissue because the results obtained were different from the tissue images in the textbook. The module helps students have good skills in classifying the types of observation tissues so that they can improve psychomotor learning outcomes (Wijayanti et al., 2016). Picture and video tissue cross-section of a module using a light microscope with information tissues. It is easier for tissue classification because the results are not much different from those in the module.

The affective aspect assessment is carried out by means of observation by the observer during the learning process. The aspects that were assessed were attitudes during practicum (cooperation, thoroughness, curiosity, responsibility), attitudes when discussing (self-confidence, politeness, tolerance), and attitudes when making reports (honest and disciplined). The affective learning outcomes of the three classes can be seen in Table 5 below.

Table 5. Affective Learning Outcomes

Class	Average	Classical Completeness (%)	Efficacy Criteria
Control	90	100	Very effective
Ex-1	92	100	Very effective
Ex-2	94	100	Very effective

The control class has the lowest value for the attitude aspect when practicum. The limited practicum time because the teacher has to demonstrate how to work in advance and the repetition of the process of making preparations that is less thin makes students nervous and tends to be careless when observing (Hamidah et al., 2014). This has an impact on the attitude of cooperation and responsibility of students who are lower than the experimental class.

The difference in attitudes when practicing is also influenced by the teaching materials used. 2 using the experimental class m odule blended learning contain pictures and video tissues make learners interested to learn and raises curiosity. In addition, pictures and videos make students more careful and careful in observing the structure of each tissue.

The discipline attitude when making reports was different in the three classes. Participants control class students lack discipline when creating and collecting reports. This attitude is due to the inability to manage the time during practicum so that a lot of time is needed when observing and identifying tissues. Experimental class 2 has a value of attitude makes the report more higher than any other class. The use of blended learning modules helps students compile reports so that reports can be collected on time. Blended learning makes the learning process more efficient by means of independent learning (Bibi, 2015).

CONCLUTION

Based on the research, learning materials and teaching materials for plant tissue materials in Jepara district Senior High School, namely students have difficulty in analyzing the relationship between the structure and function of plant tissues due to the limited use of teaching materials. The characteristics of the development of a blended learning based plant tissue module are images and videos derived from observations of plant tissues. Blended learning based plant tissue modules are suitable as high school teaching materials because the modules are very valid in terms of teaching materials and materials, easy to understand by students, and very effective on cognitive, psychomotor, and affective learning outcomes.

REFERENCES

Arpan, M., Bibi, S. & Sulistiyarini, D. (2016). Hubungan Kemampuan Kognitif dengan Kemampuan Psikomotor Mahasiswa dalam Mempersiapkan Diri untuk Workshop Komputer Prodi PTIK. *Jurnal Pendidikan Informatika dan Sains*, 5(1): 82-95.

Bibi, S. & Jati, H. (2015). Efektivitas Model Blended Learning terhadap Motivasi dan Tingkat Pemahaman Mahasiswa Mata Kuliah Algoritma dan Pemrograman. *Jurnal Pendidikan Vokasi*, 5(1): 74-87.

Direktorat Tenaga Kependidikan. 2008. *Penulisan Modul*. Jakarta: Departemen Pendidikan Nasional.

Elmovriani, D., Prasetyo, A.P.B., & Ridlo, S. (2016). Keanekaragaman Jenis Kupu-kupu di Wana Wisata Penggaron sebagai Bahan Penyusun Modul Pembelajaran Biologi. *Journal of Innovative Science Education*, 5(1): 1-9.

Habsari, A.M., Suciati, & Maridi. (2016). Pengembangan Modul Pembelajaran Biologi Berbasis Inkuiri Terbimbing *Disertai Interrelationship Diagram* pada Materi Pencemaran Lingkungan untuk Memberdayakan Keterampilan Proses Sains dan Kemampuan Berpikir Interpretasi Siswa. *Jurnal Inkuiri*, 5(3): 122-132.

Inggriyani, F., Hamdani, A.R., & Dahlan, T. (2019). Minat Belajar Mahasiswa dengan Menggunakan Blended Learning melalui Google Classroom pada Pembelajaran Konsep Dasar Bahasa Indonesia SD. *Jurnal Ilmu Pendidikan, Keguruan, dan Pembelajaran*, 3(1): 28-35.

Istighfarin, Laily. (2015). Profil Miskonsepsi Siswa pada Materi Struktur dan Fungsi Jaringan Tumbuhan. *BioEdu Berkala Ilmiah Pendidikan Biologi*, 4(3): 991-995.

Lestari, D., Susilowati, S.M.E., & Susanti, R. (2016). Pengembangan Perangkat Blended Learning Sistem Saraf Manusia untuk Meningkatkan Keterampilan Berpikir Kritis. *Journal of Innovative Science Education*, 5(1): 83-93.

Nihayah, D., Rahayu, E.S., & Nugrahaningsih. (2018). Development of Alternative Plant Tissue Culture Module to Optimize Science Process Skills and Curiosity in Modern Biotechnology Learning in High School. *Journal of Innovative Science Education*, 7(2): 336-342.

Prayitno, M.A., Wijayanti, N., & Mursiti, S. (2017). Penerapan Modul Kimia Berpendekatan Chemoentrepreneurship untuk Meningkatkan Kecakapan Hidup dan Motivasi Belajar. *Journal of Innovative Science Education*, 6(2): 139-146.

Purnomo, A., Rahmawati, N., & Aristin N.F. (2016). Pengembangan Pembelajaran Blended Learning pada Generasi Z. *Jurnal Teori dan Praktis Pembelajaran IPS*, 1(1): 70-77.

Puspitasari, Y., Reza, S.P.K., Bachtiar, Y., & Prayitno, B.A. (2019). Identifikasi Miskonsepsi Materi Jaringan Tumbuhan ada Mahasiswa Pendidikan Biologi di salah satu Universitas di Surakarta. *Jurnal Pendidikan Biologi*, 10(2): 171-178.

Rosmalina, Rahmatan, H., & Muhibbuddin. (2016). Model Pembelajaran Direct Instructions Berbantuan Multimedia untuk Meningkatkan Pemahaman Konsep Materi Struktur dan Fungsi Jaringan Tumbuhan. *Jurnal EduBio Tropika*, 4(1): 29-33.

Sugiyono. 2010. *Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif, dan R&D)*. Bandung: Alfabeta.

Sutisna, A. (2016). Pengembangan Model Pembelajaran Blended Learning pada Pendidikan Kesetaraan Program Paket C dalam Meningkatkan Kemandirian Belajar. *Jurnal Teknologi Pendidikan*, 18(3): 156-168.

Wijayanti, T.F., Prayitno, B.A., & Sunarto. (2016). Pengembangan Modul Berbasis Berpikir Kritis Disertai Argument Mapping pada Materi Sistem Pernapasan untuk Meningkatkan Kemampuan Berpikir Kritis Siswa Kelas XI SMA Negeri 5 Surakarta. *Jurnal Inkuiri*, 5(1): 105-111.

Zubail, D.R., Retnoningsih, A., & Ngabekti, S. (2018). Development of Natural Plant Module Approach Around as a Learning Resource in UIN Walisongo Semarang. *Journal of Innovative Science Education*, 7(2): 150-160.