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DEVELOPMENT OF BLENDED LEARNING TOOLS FOR BIODIVERSITY MATERIAL TO INCREASE SELF REGULATED LEARNING FOR STUDENT

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ABSTRACT: The six indicators of the Pancasila learner profile are noble character, independence, critical reasoning, creativity, mutual cooperation, and global diversity. The independent indicator is one that can be trained in biology learning. The benefit of being independent in learning was that students could understand their weaknesses and strengths. In the Merdeka Curriculum, class X is required to study biodiversity. An appropriate method is needed so that learning outcomes are achieved. One method that can be used to increase students' self-regulated learning is to implement blended learning using Canvas as a learning management system. This study aimed to produce learning tools in the form of the flow of learning objectives, teaching modules, and LKPD and describe the validity, practicality, and effectiveness of blended learning tools for biodiversity material to increase students' self-regulated learning. The research method used is research and development. The development stage was carried out at the UNESA Biology Department and then tested on a limited basis at Hang Tuah 2 Sidoarjo High School. Validity was measured based on the validator's assessment, practicality based on teacher and student responses to learning activities, and effectiveness based on student responses, and observations of self-regulated learning. The validation results show that the learning device is very valid with an average score of 4. Based on the teacher's response, the learning device received a response of 99% in the very good category, and then learning based on student responses was 98.6%. The self-regulated learning of students after participating in learning was 93% in the very high category. So that learning devices are proven to be valid, practical, and effective for use in blended learning.

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ABSTRAK: Enam indikator profil pelajar Pancasila merupakan berakhlak mulia, mandiri, bernalar kritis, kreatif, bergotong royong, dan berkebhinekaan global. Indikator mandiri adalah salah satu yang dapat dilatihkan dalam pembelajaran biologi. Manfaat mandiri dalam belajar adalah peserta didik dapat memahami kelemahan dan kekuatan dalam dirinya. Dalam Kurikulum Merdeka kelas X dituntut mempelajari keanekaragaman hayati. Diperlukan metode yang sesuai agar capaian pembelajaran tercapai. Salah satu metode yang dapat digunakan untuk meningkatkan kemandirian pembelajaran peserta didik adalah menerapkan *blended learning* dengan menggunakan Canvas sebagai *learning management system*. Penelitian ini bertujuan untuk menghasilkan perangkat pembelajaran berupa Alur tujuan pembelajaran, Modul ajar, dan LKPD serta mendeskripsikan validitas, kepraktisan, dan keefektifan perangkat pembelajaran *blended learning* materi keanekaragaman hayati untuk meningkatkan kemandirian belajar peserta didik. Metode penelitian menggunakan penelitian dan pengembangan. Tahap pengembangan dilakukan di Jurusan Biologi UNESA kemudian diujicobakan secara terbatas di SMA Hang Tuah 2 Sidoarjo. Validitas diukur berdasarkan penilaian validator, kepraktisan berdasarkan respons guru dan peserta didik terhadap perangkat pembelajaran, dan keefektifan berdasarkan respons peserta didik, dan observasi kemandirian belajar. Hasil validasi menunjukkan bahwa perangkat pembelajaran sangat valid dengan nilai rata-rata sebesar 4. Berdasarkan respons guru perangkat pembelajaran mendapatkan respons sebesar 99% dalam kategori sangat baik kemudian pembelajaran berdasarkan respons peserta didik sebesar 98,6%. Kemandirian belajar peserta didik setelah mengikuti pembelajaran sebesar 93% dalam kategori sangat tinggi. Sehingga perangkat pembelajaran terbukti valid, praktis, efektif untuk digunakan dalam pembelajaran *blended learning*.

INTRODUCTION

One of the project activities in this independent curriculum is P5 (Projek Penguatan Profil Pelajar Pancasila) (Armadani *et al*., 2023). The P5 activity was a project to strengthen Pancasila students' profiles (Budiono, 2023). The goal of p5 is to help students improve their project-creation skills through the Pancasila student profile (Nur *et al*., 2023). The Pancasila learner profile is part of the Ministry of Education and Culture's policy for elementary school through university students, to realize Pancasila learners (Aditia *et al*., 2021). The Pancasila learner profile had six indicators: noble, independent, critical reasoning, creative, mutual cooperation, and global diversity (Rusnaini *et al*., 2021).

Among the six indicators of the Pancasila learner profile, self-regulated learning was essential because can increase motivation and student's confidence and improve learning outcomes (Siddaiah *et al.*, 2017). By being independent in learning, students can understand their weaknesses and strengths (Farah *et al.*, 2019). The impact on students was not being independent in learning, not being responsible for assignments, lack of confidence in taking exams, and not paying attention to the teacher during learning, such as daydreaming and

chatting with friends in learning (Ery & Zamroni, 2019). Therefore, according to Pintrich (2000), self-regulated learning was an active, constructive self-regulation process in which students set learning goals and then tried to regulate and control motivation and behavior by being guided and limited to achieve those goals.

During the pandemic, teachers and students must adapt to the existing conditions and make careful preparations so that the teaching and learning process can be carried out properly (Mahmudi & Fernandes, 2021). Technology does not spare this adaptation, allowing the teaching and learning process to take place at any time and from any location (Fitriawan *et al.*, 2022).

However, online learning has weaknesses, such as a lack of facilitating various learning styles of students, differences in characteristics, and communication (Yeliany & Roesminingsih, 2021). Communication is important in learning. Lack of communication can cause misunderstandings (Haq, 2022). Therefore, blended learning can be one of the learning tools that can be applied to overcome this problem (Puspitasari *et al.*, 2022).

Blended learning is learning that combines offline learning and online learning using technology (Idris, 2011). Blended learning can create flexible time so that students can be independent in learning and can also expand students' learning abilities at the pace students want (Tambak *et al.*, 2022).

The general outcomes of the independent curriculum are that students observe, question, predict, plan, and conduct research. Process and analyze data and information, evaluate and reflect, and communicate through simple projects or visual simulations using technological applications (Habiba *et al.,* 2023). All these efforts were directed toward achieving sustainable development goals (SDGs) (Yunanda *et al*., 2019). Through process skills, scientific attitudes, and Pancasila's student profile, biodiversity material requires various references and literature (Novita *et al.,* 2022). Biodiversity is a multifaceted subject that encompasses various aspects such as ecological processes, species identification, conservation strategies, and more. Blended learning allows for a combination of different content delivery methods, such as online lectures, videos, interactive simulations, virtual field trips, and hands-on activities. This diverse range of materials caters to different learning styles and helps engage students effectively (Hrastinski, 2019).

According to the description of the background of the problem above, the purpose of this research is to develop a blended learning tool for biodiversity material to increase students' self-regulated learning based on its validity, practicality, and effectiveness.

METHODS

The study used research and development methods. This instrument used the validation method, response questionnaire, and observation. This research procedure was carried out with a learning tools development design using the 4-d development model because each stage's stages in the 4-d development model are evident, concise, and simple. The 4-d development model consists of four stages: define, design, develop, and disseminate.

The validation method used a validation sheet with two validators from education expert lecturers and biodiversity material experts. The learning tools validation results were then analyzed. The devices developed were validated using a Likert Scale with a range of 1-4 (not good, good enough, good, and very good). The scores obtained from the validators were then averaged and then interpreted based on the criteria for interpreting the validation results as follows: $1 \leq p \leq 1.5$ (invalid), $1.6 \leq p \leq 2.5$ (less valid), $2.6 \leq p \leq 3.5$ (valid), and $3.6 \leq p \leq 4.0$

(very valid). Learning tools are valid if the average score reaches $2.6 \leq p \leq 3.5$ (Ratumanan & Laurens, 2011).

The response questionnaire method was obtained from 5 teachers and 15 students. The observation method of students' self-regulated learning by observing 15 students was carried out for three meetings. The teacher response questionnaire method, student questionnaire, and observation use the Guttman scale data analysis technique, which is grouped into "yes" categories with a score of 1 and "no" with a score of 0. Then the score is calculated based on the following formula.

$$\text{Response percentage} = \frac{\sum \textbf{scores obtained}}{\sum \textbf{maximum score}} \times 100\% \ldots\ldots (1)$$

Furthermore, the interpretation is based on describing its practicality and effectiveness. The practicality of the learning tools is known based on the results of teacher responses and students responses to the learning tools developed with the following interpretation: 0%-40% (not good), 41%-55% (not good), 56%-70% (sufficient), 71%-85% (good), and 86%-100% (very good). Learning tools were considered practical if the average score reached ≥71% (Riduwan, 2012).

Then the effectiveness of learning tools is known based on the results of students' responses to self-regulated learning and the results of observations of students' self-regulated learning using the following interpretation: 0%-20% (very low), 21%-40% (low), 41%-60% (medium), 61%-80% (high), and 81%-100% (very high). Learning tools were effective if the average score reached ≥ 61% (Riduwan, 2010).

RESULTS AND DISCUSSION

This development research results in a blended learning tool based on a canvas learning management system for biodiversity material to increase self-regulated learning. The learning tools developed include learning objectives flow (ATP), modules, and student worksheets.

The developed ATP consists of learning objectives arranged coherently according to the meeting. Learning objectives are adjusted to biodiversity material with blended learning to increase students' self-regulated learning (Figure 1).

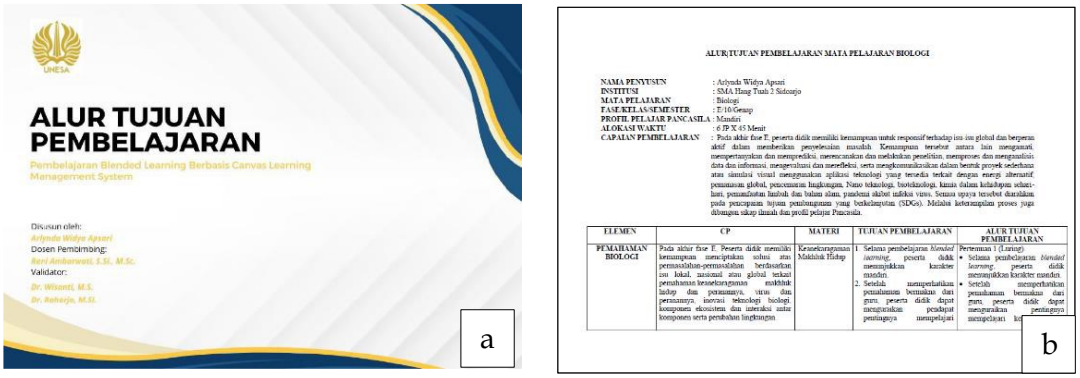

Figure 1. The flow of learning objectives (ATP) (a) cover page of ATP; (b) body of ATP**.**

The results of the ATP validation from the two validators, reviewing the seven aspects of the assessment, obtained a score of 4 in the Very Valid category with a total percentage of 100%. This value indicates that the ATP is suitable for use (Table 1). The ATP validation results show that all aspects obtained an average score of 4 with an overall percentage of 100% in the

very valid category (Table 1). ATP blended learning based on the Canvas learning management system on biodiversity material to increase students' self-regulated learning received positive comments from the validator, namely:
"*It's good*".

A good assessment from both validators shows that the ATP developed has contained important components and learning objectives for blended learning and increasing students' self-regulated learning on biodiversity material. This is in line with the Decree of the Head of the Education Standards, Curriculum, and Assessment Agency of the Ministry of Education, Culture, Research, and Technology Number 008/H/KR/2022 concerning the Learning Outcomes of the Merdeka Curriculum.

Based on this, the time allocation is 6 lesson hours with 2 offline learning and 1 online learning, then there are phase E-learning outcomes for grade X, there are elements of biological understanding and process skills, learning objectives to demonstrate independent character in accordance with the Pancasila learner profile, and the flow of learning objectives is arranged coherently by meeting (Maulida, 2022; Zhao *et al*., 2020).

Table 1. Validation results of ATP

No	Aspect	Score		Average
		V1	V2	
	Identity			
1	Learning objectives Identity	4	4	4
	Content			
2	Learning outcomes	4	4	4
3	Learning objectives	4	4	4
4	Pancasila learner profile	4	4	4
5	Flow of learning objectives	4	4	4
6	Time allocation	4	4	4
	Linguistic			
7	Compatibility with the Indonesian language rules	4	4	4
Total Percentage		100%		Very Valid

Note: V1: Biodiversity material expert, V2: Educational biology expert. 0%-40% (not good), 41%-55% (not good), 56%-70% (sufficient), 71%-85% (good), and 86%-100% (very good).

The module consists of identity, a detailed profile of Pancasila learners with independent characters trained, a summary of biodiversity material, models, and learning methods applied, learning activities carried out by teachers and students, self-reflection, assessment tools, glossary, and bibliography (Figure 2).

Module validation results from both validators by reviewing several aspects, including module identity, core components, and others. The assessment aspect obtained a score of 4 with a Very Valid category. Then there is an assessment of the module based on the assessment tool, which includes several aspects of assessment such as multiple choice, essay, self-assessment sheet, observation sheet, and communication assessment sheet. The assessment aspect obtained a score of 4 in the Very Valid category. So the total percentage obtained is 100%. The validation results show that the developed Module is feasible to be used for limited trials (Table 2).

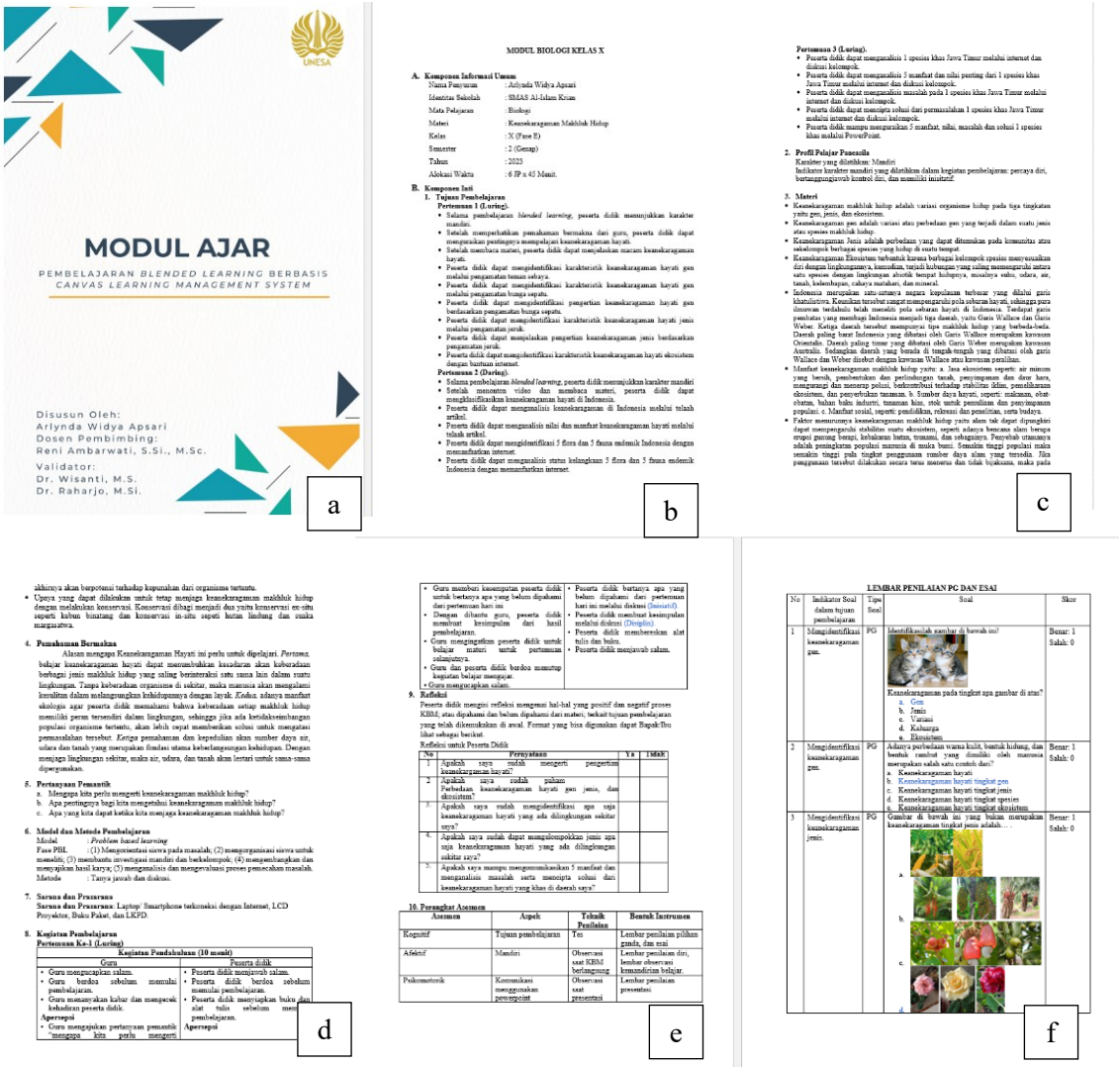

Figure 2. Module (a) module cover; (b) identity; (c) pancasila learner profile; (d) learning activities; (e) reflection; (f) assessment tool.

Module validation results show that all aspects obtained an average score of 4 with an overall percentage of 100% in the very valid category (Table 2). The blended learning module based on Canvas learning management system on biodiversity material to increase students' self-regulated learning received positive comments from the validator, namely: "*It's good*". A good assessment from both validators shows that the developed Module has contained identity, learning objectives, material summary, Pancasila learner profile, meaningful understanding, triggering questions, learning models and methods, learning activities, assessments, glossary, and bibliography. This is based on the fact that the module contains general information components; b) Core components; c) Appendix. The general information component includes several points, namely: The identity of the module author, the institution of origin, and the year the teaching module was formed, school level, class, time allocation. The core component of the module includes learning objectives, assessment, meaningful understanding, triggering questions, learning activities, and student and teacher reflections.

In the final stage, the appendices include, glossary, and bibliography (Marlina *et al.*, 2022; Chamisijatin *et al.*, 2023).

Table 2. Validation result of module

No	Aspect	Score		Average
		V1	V2	
	Identity			
1	Module identity	4	4	4
	Core component			
2	Learning objectives	4	4	4
3	Meaningful understanding	4	4	4
4	Starter questions	4	4	4
5	Pancasila learner profile	4	4	4
	Content			
6	Model and learning method	4	4	4
7	Learning materials	4	4	4
8	Learning activities	4	4	4
	Others components			
9	Infrastructure	4	4	4
10	Glossary	4	4	4
11	Bibliography	4	4	4
12	Self-reflection	4	4	4
	Assessment tool			
	Multiple choice			
13	Content	4	4	4
14	Construction	4	4	4
	Essay			
15	Construction	4	4	4
	Self-assessment			
16	Construction	4	4	4
	Observation assessment			
17	Construction	4	4	4
	Communication assessment			
18	Construction	4	4	4
	Total Percentage	100%		Very Valid

Note: V1: Biodiversity material expert, V2: Educational biology expert. 0%-40% (not good), 41%-55% (not good), 56%-70% (sufficient), 71%-85% (good), and 86%-100% (very good).

Student worksheet consists of activities carried out by students. Student worksheet was developed for students and teacher-student worksheet. The student worksheet has a preface, instructions for use, a summary of the material, learner activity sheets, a glossary, and a bibliography. The student worksheet is arranged in 3 meetings. The first is used for offline meetings to study the levels of biodiversity through observations in the picture, the second for online meetings to study biodiversity in Indonesia, and the third for offline meetings to study the value, benefits, threats, and solutions of biodiversity (Figure 3).


LEMBAR KERJA PESERTA DIDIK
Keanekaragaman Hayati
Blended learning berbasis Canvas
Learning Management System
PENYUSUN
Arlynda Widya Apsari
PEMBIMBING
Reni Ambarwati, S.Si., M.Sc.
VALIDATOR
Dr. Wisanti, M.S.
Dr. Raharjo, M.Si.
Anggota Kelompok:
a
PETUNJUK PENGGUNAAN LKPD
YUK SIMAK!
YUK IKUTI!
YUK BELAJAR!
CARI TAHU!
LKPD KEANEKARAGAMAN HAYATI BLENDED LEARNING BERBASIS CANVAS LEARNING MANAGEMENT SYSTEM
b
LKPD 1
TINGKAT KEANEKARAGAMAN HAYATI
Alokasi Waktu: 2 x 45 menit
Pembelajaran: Luring
TUJUAN PEMBELAJARAN
YUK BELAJAR!
Tingkat Keanekaragaman Hayati
A. Keanekaragaman Gen
Gambar 2.1 Keanekaragaman gen (Sumber: Dokumen Pribadi)
LKPD KEANEKARAGAMAN HAYATI BLENDED LEARNING BERBASIS CANVAS LEARNING MANAGEMENT SYSTEM
c
Diskusikan!
Keanekaragaman Jenis
Gambar A
Gambar B
Ujung
Gambar C
Pangkal
LKPD KEANEKARAGAMAN HAYATI BLENDED LEARNING BERBASIS CANVAS LEARNING MANAGEMENT SYSTEM
d

Figure 3. Student worksheet for students (a) cover; (b) instructions for use; (c) offline meeting; (d) observation activity; (e) online meeting; (f) review activity; (g) offline meeting; (h) solution creation activity.

The teacher's student worksheet contains a preface, instructions for use, and instructions that need to be t by the teacher during learning activities in a blue box, a glossary, a bibliography, and an answer key (Figure 4).

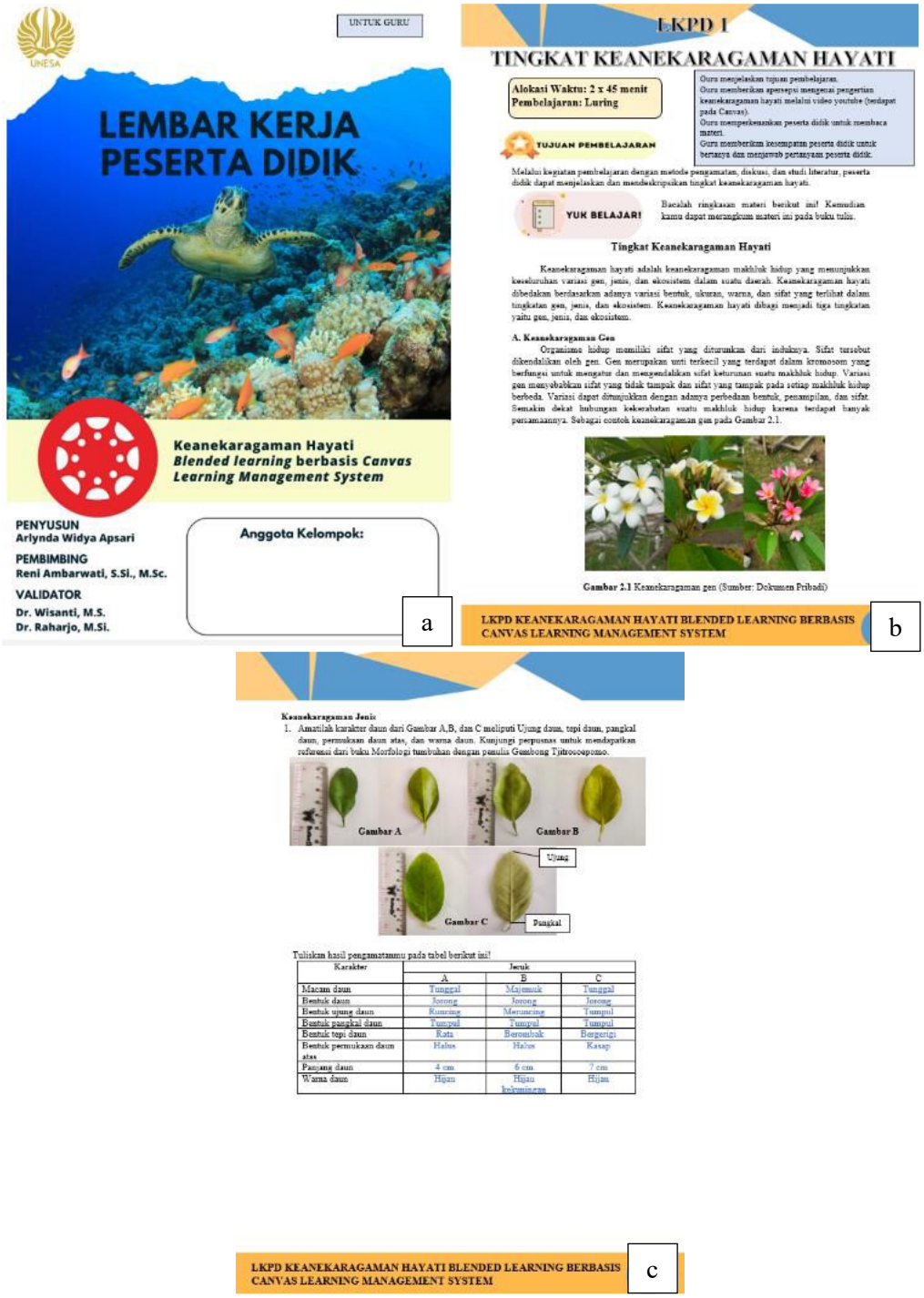

Figure 4. Student worksheet for teacher (a) cover; (b) instructions; (c) answer key.

The student worksheet of the second meeting, which was carried out online, was integrated with the Canvas learning management system. The Canvas learning management system contains discussions based on the learning activities organized in the Module (Figure 5).

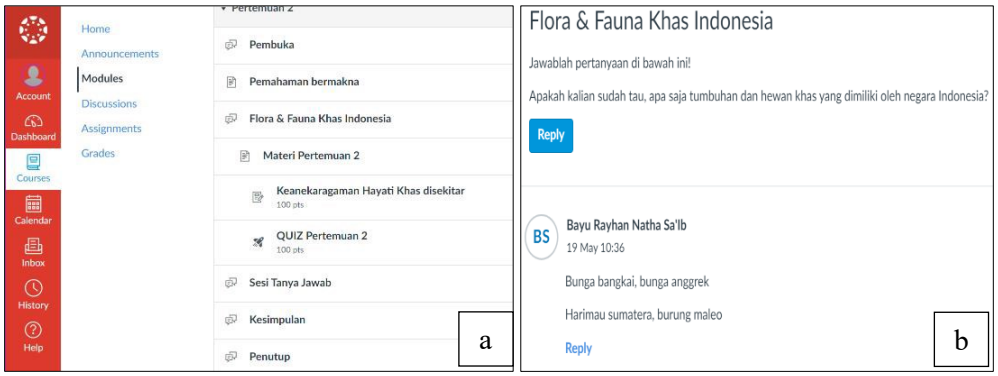

Figure 5. *Canvas learning management system* (a) online meeting; (b) discussion.

The validation results from both validators by reviewing several aspects, including content feasibility, presentation feasibility, language feasibility, suitability of blended learning, and suitability for independent learning. Each assessment aspect obtained a score of 4 with a very valid category with a total percentage of 100% (Table 3).

The results of LKPD validation show that all aspects obtained an average score of 4 with an overall percentage of 100% in the very valid category (Table 3). A good assessment from both validators shows that the developed LKPD can be used as a teacher's guide in managing blended learning based on the Canvas learning management system on biodiversity material to increase students' self-regulated learning. Student worksheets are a set of activities that must be done by students (Istiqomah *et al.*, 2022). Student worksheets are prepared based on the topic or material chosen as a guide or form of learner activities in learning activities (Gusti *et al.*, 2022). Student worksheets can be in the form of theoretical tasks or practical tasks that require learner skills (Matsun *et al.*, 2022). Learner worksheets can provide convenience for teachers in teaching and learning activities and can train students to be independent in learning (Mardiyanto, 2019).

Table 3. Validation result of student worksheet

No	Aspect	Score		Average
		V1	V2	
	Content			
1	Organized systematically	4	4	4
2	Task	4	4	4
3	Problem	4	4	4
4	Activities	4	4	4
	Linguistic			
5	Compatibility to Indonesian language rules	4	4	4
6	Sentences	4	4	4
	Presentation			
7	Display suitability	4	4	4
8	Size suitability	4	4	4
9	Blended learning suitability	4	4	4
10	Self-regulated learning suitability	4	4	4
	Total Percentage	100%		Very Valid

Note: V1: Biodiversity material expert, V2: Educational biology expert. 0%-40% (not good), 41%-55% (poorly), 56%-70% (sufficient), 71%-85% (good), and 86%-100% (very good).

Based on this validation, the blended learning tool based on the canvas learning management system for biodiversity material to increase students' self-regulated learning is declared very valid with an average score of 4 and is suitable for limited trials.

The practicality of the learning tools is reviewed based on the results of teacher responses and students' responses to the developed learning tools. In the ATP, eight statements are obtained with a percentage of "Yes" of 97.5% with a very good category. In the Module, there are ten statements obtained with a percentage of "Yes" of 100% with a very good category. In the student worksheet developed with ten statements, the percentage of "Yes" responses was 100% in the very good category. So, the total response percentage is 99% with a very good category (Table 4).

In the limited trial, teachers' responses to the learning tools and students' responses to blended learning based on a canvas learning management system on biodiversity material to increase self-regulated learning were obtained to describe the practicality of the learning tools. The results of teacher responses showed a total percentage of teacher response results of 99% in the excellent category (Table 4).

Teachers gave positive comments on the developed ATP, namely:

"*The learning objectives are quite numerous and in accordance with the ABCD rules.*"

In addition, the teacher also gave suggestions on the learning objectives, namely:

"*The learning objectives on the selected Pancasila learner profile should be more detailed.*"

This shows that the ATP developed can be used by teachers in blended learning for biodiversity materials. The use of ATP in blended learning for biodiversity materials can be a valuable resource for teachers. ATP is a learning tool to help facilitate students' understanding and learning experiences. The flow of learning objectives helps teachers to set learning objectives that are relevant to students' needs (Diduck *et al*., 2019). Set learning objectives could also be related to the Pancasila profile to be implemented, preferably containing each character indicator of the Pancasila learner profile to be trained (Hariadi *et al*., 2022). The character to be trained is important because character education is a system that can provide planting of character values to students so as to create a form of trust, self-awareness, readiness to do accordingly, and activities whose forms can increase noble values both to God Almighty and fellow humans and the surrounding, environment (Sulastri *et al*., 2022).

Teachers gave positive comments on the developed Module, namely:

"*The Pancasila learner profile in the developed module is good and complete.*"

This shows that Modules can be used for teachers in blended learning of biodiversity materials. A good module will provide clear guidelines on how to integrate online and face-to-face components in learning, as well as adjust learning strategies to the needs of students and learning objectives. Teachers can manage blended learning more effectively with a structured and detailed lesson plan. This module provides clear guidance on what to do in the learning activities, how to structure and integrate online and face-to-face components, and how to evaluate the achievement of learning objectives (Ichsan *et al*., 2020).

Teachers gave positive comments on the developed student worksheets, namely:

"*The complete teacher's student worksheet also has instructions. Usually, there is only an answer key. Canvas looks quite simple to use because it can prepare activities before the online class takes place*".

This shows that the student worksheet can be used by teachers in blended learning of biodiversity material. Student worksheet is a document or worksheet specifically designed to guide students in independent and active learning. In the context of blended learning for biodiversity material, the student worksheet has the following characteristics and components:

Learning Materials: includes learning materials relevant to biodiversity, including understanding, levels of biodiversity, biodiversity in Indonesia, values, benefits, problems, and solutions to maintain biodiversity. The material can be presented in text and images according to the learning content (Novita *et al.,* 2022). Learning Activities: provides learning activities that activate students' participation to identify, examine, analyze, and communicate (Saraswati *et al.,* 2022). Guidelines and Instructions: Include clear guidelines and instructions on how students should do each activity. They should provide specific instructions, structured steps, and examples that help students understand the task and achieve the learning objectives (Habiba *et al.,* 2023). The student worksheet also includes rubrics or self-evaluation questions that allow students to measure their understanding and progress related to the biodiversity material. This self-evaluation can help students see the extent to which they have achieved the learning objectives and identify areas for improvement (Peter *et al.,* 2019).

Table 4. Teacher response to learning tools (n = 5)

Statement	Percentage (%)	
	Yes	No
ATP		
component of learning objectives is presented coherently and clearly	100	0
Learning objectives are organized coherently	100	0
Learning outcomes in the phases are clearly organized	100	0
Elements with learning outcomes are clearly organized	100	0
The selected Pancasila learner profile is in accordance with the learning objectives	80	20
The material presented is in accordance with the learning objectives	100	0
The time allocation provided is effective to be applied to learning	100	0
The language used is in accordance with good and correct Indonesian	100	0
Percentage of ATP	97,5	
Category	Very Good	
Modul		
components are presented coherently and clearly	100	0
Learning activities are organized with a blended learning mode	100	0
Learning activities are organized according to the syntax of the problem-based learning model	100	0
Meaningful understanding and triggering questions are in accordance with the learning objectives	100	0
Pancasila learner profile presented in accordance with learning activities	100	0
The material presented is in accordance with the learning objectives	100	0
Learning activities that are structured to increase students' self-regulated learning	100	0
The assessment presented is in accordance with the learning needs	100	0
The time allocation provided is effective to be applied to learning	100	0
The language used is in accordance with good and correct Indonesian	100	0
Percentage of Modul	100	
Category	Very Good	
Student Worksheet		
The appearance of the cover page is attractive	100	0
The selection of fonts, sizes, and spaces used is appropriate so that it makes it easier for students to read	100	0
The existence of images can convey the content of the material	100	0
The combination of pictures and writing is interesting	100	0

Statement	Percentage (%)	
	Yes	No
The instructions for activities are clear so that it makes it easier for the teacher to guide students to carry out all the activities	100	0
Facilitates teachers in guiding students to make observations	100	0
Facilitates the teacher in guiding students to explore the information needed to solve problems	100	0
Helps teachers guide students in making observations	100	0
Helps teachers in guiding students to analyze problems	100	0
Facilitates teachers in guiding students to create one solution to the problem	100	0
Percentage of Student Worksheet	100	
Category	Very Good	
Average Total Percentage	99	
Category	Very Good	

Note: 0%-40% (not good), 41%-55% (poorly), 56%-70% (sufficient), 71%-85% (good), and 86%-100% (very good)

Practicality is reviewed from students' responses to the developed learning tools. There are 15 statements distributed to 15 students. Of the 15 statements, the average "Yes" response was 98.6% in the very good category (Table 5). This shows that almost all students gave positive responses to the blended learning tool based on the Canvas learning management system developed. Students positively responded to blended learning based on a canvas learning management system for biodiversity material to increase self-regulated learning by 98% in the very good category (Table 5). Students commented positively on the learning tools developed:

"*This is the first time I have participated in blended learning since entering high school so far offline. Just found out that there is a Canvas class*"

"*Online classes are simple and not complicated*"

"*This is the first time observing my friends who can joke but get knowledge because of mutual eye shape discussions*"

This shows that students get new experiences in blended learning using the Canvas learning management system (Kastner, 2020). Some students can access the Canvas learning management system through a computer or device with an internet connection but do not confirm the email, so they can only log in once without creating a password. To overcome this, teachers should record emails and invite students to enter the Canvas learning management system via email (Khoeri *et al.*, 2021). Students can easily see the list of assignments and access learning materials such as files, videos, or links provided by the teacher so that learners become independent in managing and organizing their time in learning. However, it is consistent with the statement "I attend class until completion," which received a response of 86%. Because of this flexibility during online learning, some students finish learning faster because they have completed activities in the Canvas learning management system (Garcia et al., 2020; Gunarathna et al., 2021).

Based on the description of the teacher's response to the learning tools and the student's response to learning, the blended learning tools based on the canvas learning management system for biodiversity material to increase students' self-regulated learning is declared very practical and feasible to use in learning.

Table 5 Students' response to blended learning based on the canvas learning management system on biodiversity material (n = 15)

No	Statement	Percentage "Yes" (%)
1	I enjoy following blended learning using Canvas	93
2	I am happy to follow the learning of biodiversity material	100
3	I participated in the lesson until the end	86
4	Learning with blended learning with LMS Canvas makes me more active in learning activities.	100
5	The learning that takes place makes it easy for me to discuss with friends	100
6	I was able to complete the LKPD on time	100
7	Learning by blended learning with LMS Canvas makes it easy for me to understand biodiversity material	100
8	The learning that takes place makes it easy for me to interact with a group friends	100
9	I concentrate properly in the learning process	100
10	I can read the material for learning anytime and anywhere.	100
11	Blended learning using Canvas provides a new experience for me	100
12	The teacher guided me well during the learning process	100
13	I can properly organize the learning activities according to the teacher's instructions.	100
14	I can take quizzes repeatedly to enhance my understanding.	100
The average percentage of "Yes"		98,6 Very Good

Note: 0%-40% (not good), 41%-55% (poorly), 56%-70% (sufficient), 71%-85% (good), and 86%-100% (very good)

Students gave a positive response to self-regulated learning based on self-assessment by giving a "Yes" response of 93% in the very high category (Figure 6). This shows that after blended learning and practicing students' self-regulated learning, almost all students' self-regulated learning gets very high results.

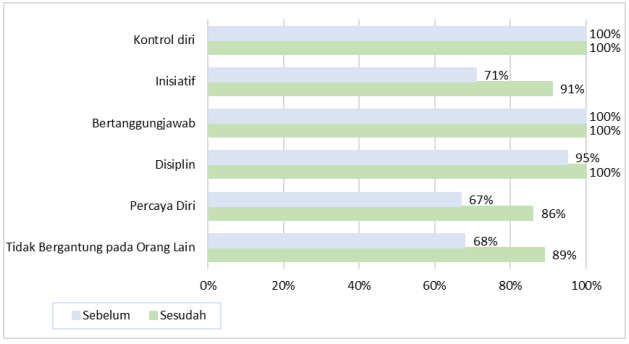

Figure 6. Self-regulated learning results are based on student self-assessment.

Effectiveness based on student observation is carried out when learning takes place. There are three meetings consisting of two offline meetings and one online meeting. In offline meetings, the percentage of students' self-regulated learning is 93%, with a very high category. At the online meeting, the percentage of students' self-regulated learning was 98%, with a very high category. So, the total percentage result is 95%, with a very high category (Figure 7). This shows that almost all students have very high self-regulated learning.

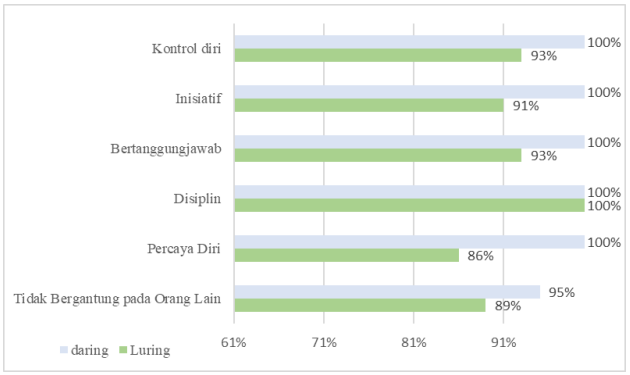

Figure 7 Observation results of students' self-regulated learning.

Students respond to the self-regulated learning based on self-assessment before and after the implementation of blended learning based on the Canvas learning management system for biodiversity material to increase the self-regulated learning of students. The percentage before was 82% in the very high category. The results of self-regulated learning after learning were 93% in the very high category (Figure 6). This shows that there was an increase of 11% in the self-regulated learning of students in the very high category. The self-confidence indicator has a percentage before 67% and a percentage after learning of 86% to be the lowest indicator among other indicators. Some students hesitate and even tend to be silent to express their own opinions without being influenced by friends in class and discussions (Gambo & Shakir, 2023). Students who do not have good communication skills may feel less confident in expressing their opinions (Hsu *et al.*, 2022). Students may worry about their ability to express ideas clearly or be afraid of using the wrong language, and students often fear judgment or rejection from classmates or teachers, fear that it could be perceived as inhibiting them from actively participating in discussions (Fadhilah, 2022).

The self-regulated learning of students based on observation was 95% in the very high category (Figure 7). This shows that students have very high self-regulated learning. The indicator does not depend on others, and two statements get a student response of 80% and 86%. Students tend not to read the material before class starts because students often have a busy schedule with many assignments and other activities outside of class. So that students do not fully realize the importance of reading material before class starts. Students may assume that they can rely on teacher explanations or learning materials delivered in class (Farida, 2023).

Students do not yet have their package books because of the limited number of printed books distributed to schools. Indicators of initiative self-regulated learning in the statement of summarizing without being told, there are still students who tend to ignore this because students are not fully aware of the benefits of summarizing learning. They may not understand that summarizing can help them organize and consolidate the information learned, improve understanding, and facilitate recall (Atieka & Budiana, 2022).

In online learning, the indicator does not depend on others. Two students have difficulty logging into Canvas because the students forget the password or have not created a password. Because of this, the teacher provides a solution by inviting students to log in via email so that students can attend classes online. Based on the response of students' self-regulated learning and observation of self-regulated learning, blended learning tools based on canvas learning management systems for biodiversity material to increase students' self-

regulated learning was declared very effective with an average score of 93% and proven to increase students' self-regulated learning.

CONCLUSION

The result of the research showed that the blended learning tools for biodiversity material to increase students' self-regulated learning were very valid, with an average score of 4. The learning tools were very practical to use in learning based on teacher responses of 99% in the excellent category. Learning tools were effective in increasing students' self-regulated learning based on students' responses to self-regulated learning after participating in learning by 93% in a very high category. Therefore, the learning tools are proven to be valid, practical, and effective to be used in blended learning.

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