



## Biology microteaching book: A practical approach from various countries

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### ARTICLE INFO

#### Article history

Received: 16 Oktober 2020

Revised: 23 July 2021

Accepted: 02 February 2022

#### Keywords:

Biology

Microteaching

Pre-services

Teacher

Teaching skill



### ABSTRACT

Pre-service Biology teachers must be equipped with good biology skills, 21<sup>st</sup>-century teaching skills currently needed, and possess four competencies (pedagogic, professional, personality, and social). The study aims to develop a biology microteaching book to create competent, confident, and creative biology teachers with a practical approach. The development method used is ADDIE. The research instrument uses a questionnaire to measure responses from media experts, content experts, lecturers, and students (the product users). The study reports that the product of a practical approach-based microteaching book is feasible and can be used in Biology learning. This book can be used as a guide and reference for prospective biology teacher students in determining the right microteaching model.

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Siburian, J., & Sadikin, A. (2022). Biology microteaching book: A practical approach from various countries. *Biosfer: Jurnal Pendidikan Biologi*, 15(1), 123-133. <https://doi.org/10.21009/biosferjpb.17630>

## INTRODUCTION

Preparing quality pre-service teachers who can teach effectively is a challenge for educational institutions that generate them. Identification of appropriate pedagogic approaches is a challenge and debatable discussion (Barbara et al., 2004; Cochran-smith & Villegas, 2015). In the last few years, teacher education studies have shifted to a practical-based. The developed studies explore new approaches to advance pre-service teachers' skills through mentoring activities, feedback, and technology-based learning. One of the main challenges faced by pre-service teacher education institutions is preparing confident and reflective pre-service teachers who have a habit of improving their teaching skills (Knight et al., 2014). Moreover, science literacy is necessary to equip the pre-service biology teachers (Ristanto et al., 2018). The current pre-service biology teachers need to master STEM by connecting biology science to other sciences; thus the science will be more beneficial (ÇINAR et al., 2016).

One of the forms of learning that can improve the pre-service teachers' skills is through a microteaching training program. Microteaching is a learning process and practice that integrates theories studied with teaching practice activities in the classroom in the conditioned time, limited students, and certain content packages and are performed in a specific teaching laboratory (Allen, 1979; Amobi, 2005; Benedetti & Reed, 1998). Every country has a different microteaching model. Australia has a characteristic in the application of microteaching in pre-service teacher education, which is with 2 (two) cycles of lecture class and one cycle in a normal or natural class at school (Stahl et al., 2018). The characteristic of microteaching in Turkey is that one cycle includes planning, teaching, criticizing, re-planning, re-teaching, and re-criticizing. Whereas Spanyol has different characteristics of microteaching implementation compared to other countries, namely in the assimilation activity, instead of being conducted in a classroom, is conducted at home and becomes an assignment. Moreover, the accommodation stage that is supposed to be conducted at home, it is conducted in the classroom with pre-service teacher guidance (Fidalgo-blanco et al., 2015). Further, the application of microteaching in Canada is similar to those in Indonesia, namely by integrating theories and practices in the classroom that consist of 2.5 hr face-to-face lecture and 1.5 hr practice at the microteaching laboratory. The activity consists of 13 meetings (Royea & Nicol, 2018). The latest development of the microteaching model occurs in Japan with an improvisation using a doll as a medium to apply microteaching. The cycle 1 is normal practice (a microteaching role play, reflection, feedback, and essay writing). Cycle 2 is a practice with a doll. Cycle 3 is a normal practice and the last cycle is an overall reflection (Wakimoto et al., 2019). Microteaching in Indonesia comprises several stages, namely, introduction to concepts, selection of learning models, teaching practice at the microteaching laboratory, feedback, and a microteaching re-practice designated to pre-service teacher students for teaching practice in front of a small class and limited time to train self-confidence, teaching skills, and class management. The program has been long implemented at the FKIP of Universitas Jambi. The program, however, has changed over time. There are no studies, however, on the development of practical approach-based microteaching book to add knowledge and insight of pre-service biology teachers at FKIP Universitas Jambi. The research will answer the following problem: how do the students view the microteaching program, are there any shortcomings that need to be added, or whether or not the implementation is good. Based on the problem, the authors submit research and development of a microteaching text book for biology based on a practical approach to creating confident, reflective, and humanist teachers. The purpose of this research is to develop a special biology micro-teaching book to create competent, confident and creative biology teachers with a practical approach.

### Microteaching Development

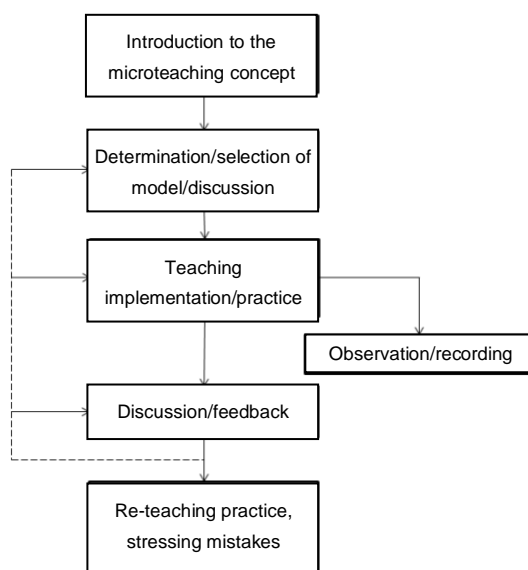
Microteaching is a learning process and practice that integrates theories studied with practical activities of teaching in the classroom with a conditioned time, limited students, certain content packages, and is conducted at the teaching specific laboratory (Allen, 1979; Amobi, 2005; Benedetti & Reed, 1998). Every country has different microteaching models. Australia has a characteristic in the application of microteaching in pre-service teacher education, which is with 2 (two) cycles of lecture class and one cycle in a normal or natural class at school (Stahl et al., 2018). The characteristic of microteaching in Turkey is that in one cycle it includes planning, teaching, criticizing, re-planning, re-teaching, and re-criticizing. Whereas Spanyol has different characteristics of microteaching implementation compared to other countries, namely in the assimilation activity, instead of being conducted in a classroom, is conducted at home and becomes an assignment. Moreover, the accommodation stage that is supposed to be conducted at home, it is conducted in the classroom with pre-service teacher guidance (Fidalgo-blanco et al., 2015). Further, the application of microteaching in Canada is similar to those in Indonesia, namely by integrating theories and practices in the classroom consisting of 2.5 hr face-to-face lecture and 1.5 hr practice at the microteaching laboratory. The activity consists of 13 meetings (Royea & Nicol, 2018). The latest development of the microteaching model occurs in Japan with an improvisation using a doll as a medium to apply microteaching. Cycle 1 is normal practice (a microteaching role play, reflection, feedback, and essay writing). Cycle 2 is a practice with a doll. Cycle 3 is a normal practice and the last cycle is an overall reflection (Wakimoto et al., 2019). The use of microteaching videos helps pre-service teachers' understanding to improve teaching skills (Sofyan et al., 2019).

Reflection in microteaching assists pre-service science teachers regarding preparation on the table during learning and attention to the real environment of the students' conditions and age (Karlström & Hamza, 2019).

The microteaching approach can facilitate pre-service teachers in preparing themselves for teaching and to be better than any subject (Burrell et al., 2019). Microteaching currently faces digital challenges due to industrial revolution 4.0; therefore, it is required to be able to manage the classroom virtually. Learning is no longer a face-to-face class since digital, internet, teachers, and students have become one in digital-based learning (Azrai et al., 2020). Traditional microteaching is left behind and replaced by blended learning-based microteaching that improves students' performance and satisfaction (Yang, 2020). Skills to provide stimulus to students is crucial in learning despite their limitations in the practice (Khan et al., 2020).

### Microteaching Models in Various Countries

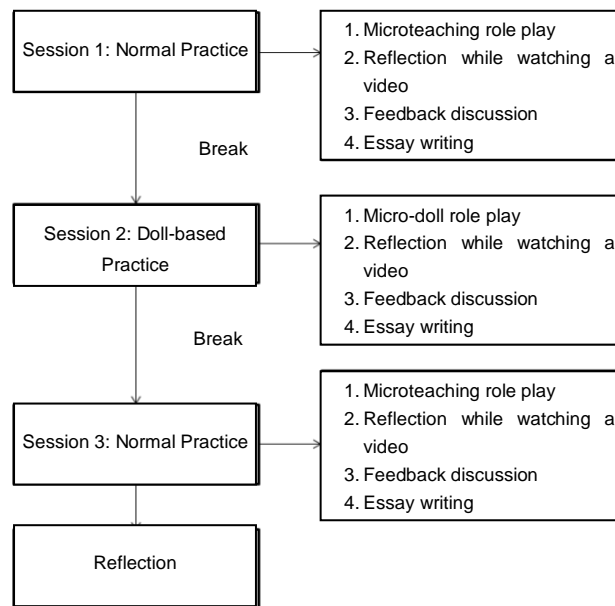
Microteaching has been introduced to Indonesia by several universities, namely IKIP Yogyakarta (Universitas Negeri Yogyakarta), IKIP Bandung (Universitasn Pendidikan Indonesia), IKIP Ujung Pandang (Universitas Hasanudin), and FKIP Universitas Kristen Satyawacana. A scientific meeting held in May 1977 suggested microteaching be included in the higher education curriculum. Microteaching in Indonesia is applied to improve pre-service teachers' teaching skills (Koesoemo & Shore, 2015). Online microteaching has developed in the current education world. The online microteaching was conducted at Universitas Terbuka. The results indicate that students understood online microteaching better (Kusmawan, 2017). The microteaching model in Indonesia is illustrated in Figure 1.



**Figure 1.** Microteaching Model (Koesoemo & Shore, 2015)

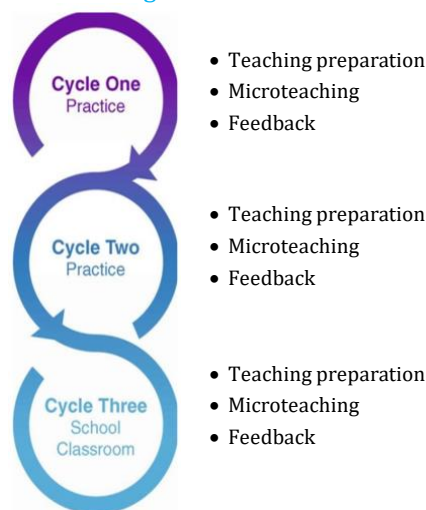
Microteaching in Japan has an interesting improvisation. Differ from other countries, the improvisation is conducted using a doll as a medium to play role in a microteaching practice. The stage includes session 1, which is the normal practice where each group consists of three pre-service teacher students. One student acts as a teacher and the rest are the students. The stages can be seen in Figure 2.

Educators continuously struggle to find the most effective strategy to train pre-service teachers that participate in the teacher education program with their faith, their description as a teacher, and their memories as a student. How contemporary pre-service teacher education is framed by various pressures and challenges before discussing the newest challenges toward practical-based clinical approaches in teacher education (Stahl et al., 2018) . Microteaching is effective in improving teachers' teaching skills in various subjects (Sayon, 2020).



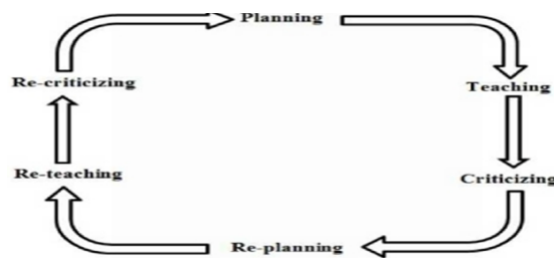
**Figure 2.** Microteaching Model in Japan (Wakimoto et al., 2019)

Several issues occur in Australia regarding pre-service teacher education. It is important to realize that the research is positioned in space debate where there are certain political pressures on how effective the teacher is made; the program itself deals with fragmentation, misdoubt about their relevance, and various resource obstacles. We have drawn our position on how pre-service teacher education should be seen to develop with a new approach to getting involved with teacher identities (Stahl et al., 2018). Based on 25 studies issued between 1996 and 2016, the focus of these studies was on the diversity of training models of pre-service teacher education and critically consider the roles of training, feedback, reflective training, and development of play skills in each model. The Australian microteaching model can be seen in Figure 3.



**Figure 3.** Microteaching Model in Australia (Stahl et al., 2018)

The microteaching process in Turkey consists of nine stages, namely: (1) Lesson planning which has a clear goal and appropriate planned order, (2) Set induction: a process to gain students' attention at the beginning of a class, (3) Presentation: explain, tell a story, provide appropriate illustrations and examples, planned repetition if needed, (4) Stimulus variation: avoid boredom among students through movement, focusing, silence, and changes in sensory channels, etc. (5) Utilization of audio: suitable visual aids, (6) Strengthening: recognizing students' hardship, listening, encouraging participation and students' response, (7) Asking a question: smoothness in asking questions, giving questions, and adapting the questions, (8) Silent and non-verbal signals (body language), (9) closure: closing methods of learning sessions to raise relevances of what has been learned, its relationship with past learning and its application for future learning (Saban & Çokla, 2013). The microteaching model from Turkey is illustrated in Figure 4.

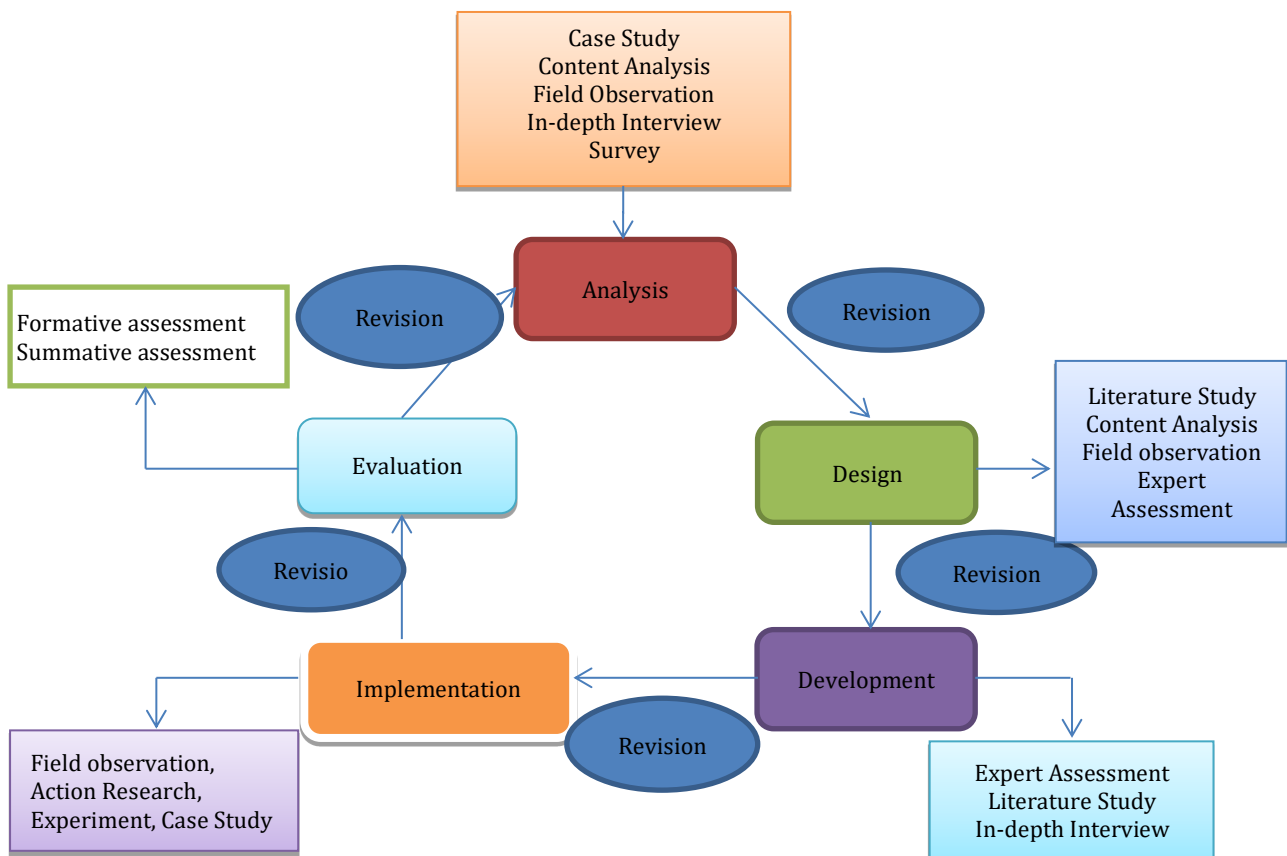


**Figure 4.** Microteaching Model in Turkey (Saban & Çokla, 2013)

A good book has the following characteristics: it has ISBN, uses formal language styles and good sentence structures, at minimum SPOK (subject, predicate, object, and description), uses references, contains numerous thoughts, scientific and research concepts, and is issued by a credible publisher (Tegeh, Jampel, & Pudjawan, 2015). A textbook is a handbook for a course that is prepared and written by experts in its field by meeting the textbook and is officially published and distributed (Puspasari, 2019).

**METHODS**

The research type was research and development. Development research is a research method used to generate certain products or outputs and tests the products to find out whether or not the product is feasible that involves the product users (Sugiyono, 2015). The development type chosen in this development research was the ADDIE development model. It was expected that through revision and evaluation in each stage, the product will gain inputs and assessments from experts and practitioners thus will result in a quality product. Therefore, this will reduce mistakes and shortcomings of the produced products. The ADDIE development model comprises five stages, namely, analysis, design, development, implementation, and evaluation (Rusdi, 2018). The development model can be seen in Figure 5.



**Figure 5.** ADDIE Development Model (Rusdi, 2018).

**Development Research Procedure**

1. Analysis

Activities in the analysis stage include a study of contents, students, curriculum, and requirements of the microteaching regarding whether or not the development of a microteaching book of biology with a practical approach is needed. The pre-service biology teachers must be equipped with skills in managing the learning with blended a learning (Yustina et al., 2020). The instrument used in the analysis stage was interview guidance to

generate data from students and lecturers, namely requirements expected from the microteaching course. The questionnaire instrument was intended to screen data on the perception of students who have learned microteaching regarding its strengths and weaknesses. The examination of the most appropriate microteaching model for Biology content was followed.

## 2. Design

The storyboard of the developed product would be created in the design stage. Researchers would pour concepts generated from the analysis stage to create storyboards suitable to the product users' needs.

## 3. Development

In the development stage, the storyboard created would be implemented. The product produced would be validated by the experts to gain input and assessment. The media and content validators were asked for their comments about the developed product.

## 4. Implementation

The implementation stage is a trial stage of the validated product to the users. Two trials were conducted in this stage, namely, a small group trial and a large group trial. The small group trial involved 6 students, whereas the large group trial involved 30 students.

## 5. Evaluation

In this stage, the product was evaluated according to the inputs from small group and large group trials. The evaluation consisted of inputs from the validators, students, and teachers as users. The evaluation activity was conducted in every stage from the analysis, design, development to implementation.

### Instrument of Data Collection

The data collection instrument consisted of (1) interview guidance to screen data of students' and lecturers' requirements of the to-be-developed microteaching book, (2) questionnaire to screen data of students' response to the microteaching application, (3) validation questionnaire to screen data of inputs and comments from content and media validators, (4) trial questionnaire to screen data of students' response to the developed product.

### Data Analysis Technique

#### a. Validation Data Analysis

The validation data would be analyzed using Formula 1.

$$SV = \frac{\text{mean of each validator score}}{\text{maximum score}} \times 100\%$$

SV = percentage of mean score of the validation result

The data analysis results will be compared to the score of validation criteria presented in [Tabel 1](#).

**Table 1.**

Criteria of Product Validity

Score range	Criteria	Description
$90\% \leq SV \leq 100\%$	Very Valid	No need revision
$80\% \leq SV < 90\%$	Valid	Need Revision
$60\% \leq SV < 80\%$	Less valid	Substantial revision
$0\% \leq SV < 60\%$	Invalid	Cannot be used

Source: Sugiyono (2015)

The validation data analysis was used to analyze data from the questionnaires given to the validators. The questionnaire was different from those given to the lecturers and students.

#### b. Trial Data Analysis

Data of the product trial were analyzed using Formula 2

$$\text{Percentage of student response} = \frac{\text{number of positive response}}{\text{total number of students}} \times 100\%$$

The results of the trial data will be adjusted to the following criteria

**Table 2.**

Criteria of product trial validity

Criteria	Criteria
$90\% \leq SV \leq 100\%$	Excellent
$80\% \leq SV < 90\%$	Good
$60\% \leq SV < 80\%$	Poor
$0\% \leq SV < 60\%$	Bad

(Adaptation of Arikunto, 2003)



## RESULTS AND DISCUSSION

### Analysis Stage

Based on the survey of 270 respondents on the need for a microteaching textbook, 86.5% of the respondents stated that they really need it and 13.5% of them stated that they need it, and 0% responded that they do not need it. The result suggests that the pre-service biology teachers urgently need a textbook about microteaching in biology based on a practical approach. The book will reduce their anxiety as indicated by 69.7% of them considered the textbook will greatly help and 29.3% said that it will help. This is proof that the presence of the microteaching textbook in Biology based on practical approach is very much awaited. The competence of the pre-service biology teachers needs to be improved to face the development in communication and information technology (Jungck et al., 2020).

### Design Stage

The design of the microteaching textbook in Biology based on a practical approach was examined from several literacies. This is by forwarding breakthroughs in objective change from 8 basic skills of teaching to the 21st-century skills, scientific process skills that are in demand, and the characteristics of biology education. The pre-service biology teachers need to be developed according to the research data; therefore, the data are useful in developing teachers' skills currently required (Robeva et al., 2020). Industrial revolution 4.0 has changed the education world that leads to new education. Education must utilize artificial intelligence and internet connection to connect to each other (Shahroom & Hussin, 2018).

### Development Stage

The provisional result of the development was in the form of an initial draft of the Principles and Processes of Biology Learning textbook. Once the product was completed, it would be validated and revised according to the experts' suggestions. Validation was conducted twice. The results of the expert validation on the developed textbook are presented in Table 3.

**Table 3.**

Results of expert validation on the developed textbook

No.	Validation	Score	Description
1	First	77.0	Less valid
2	Second	93.5	Very valid

Table 3 indicates that the results of expert validation of the developed textbook received a score of 77 in the first validation with a less valid category. In the second validation, however, the score was 93.5 with a very valid category. Suggestions of improvement from the validators for each development aspect of the textbook are shown in Table 3.

**Table 4.**

Suggestion of Improvement for the Product by Validators in the first validation

No.	Assessed Aspect	Suggestion of Improvement	Revision
1.	The book components are completed according to the rules of textbook preparation.	The textbook needs to be completed with the authors' biography	Revised as suggested, the textbook is equipped with the authors' biography.
2.	The font types used are consistent and clear to read.	Do not use various fonts, use two types only.	Types of font are revised according to suggestions.
3.	The font size used is appropriate and clear.	The font size is clear enough to read	No revision
4.	Images are displayed according to the text.	Appropriate	No revision
5.	The image size is appropriate and clear to see.	Images should be of the same size.	The image size is revised
6.	Images displayed help in explaining the content.	Each image should have a description so readers could easily understand	All images have a description
7.	The color composition used is interesting.	Tables should be given more interesting colors.	The tables are colored according to suggestions.
8.	The design layout is proportional and interesting.	Revise the book page writing	The book page is created using the footer.
9.	The content presented is consistent with the competencies to be achieved.	Consistent	No revision

No.	Assessed Aspect	Suggestion of Improvement	Revision
10.	The content presented follows the curriculum used.	Appropriate	No revision
11.	Content presented is completed	Props content is still lacking, needs to add how to develop the props	Content on props development has been added
12.	Content is presented systematically	Content on laboratory management is less systematic, please sort it.	The content has been sorted accordingly.
13.	The textbook is predicted to be able to drive students' motivation.	Yes, activities contained could drive students' motivation.	No revision

Based on [Table 4](#) suggestions of improvement from the validators in the first validation included the book needs to add the authors' biography, use only two types of font, images should be of the same size, each image should have a description, tables should include an image, improvement in the book page, to add content on props since the book has less content about props, and laboratory management content is less systematic. These suggestions have been implemented and continued with product improvement in the second validation.

**Table 5.**  
Suggestions of Improvement for Product by Validators in the Second Validation

No.	Assessed Aspect	Suggestion of Improvement	Revision
1.	The book components are completed according to the rules of textbook preparation.	Appropriate.	No revision
2.	The font types used are consistent and clear to read.	Types of font are consistent.	No revision
3.	The font size used is appropriate and clear.	The font size is clear to read	No revision
4.	Images are displayed according to the text.	Appropriate.	No revision
5.	The image size is appropriate and clear to see.	Appropriate.	No revision
6.	Images displayed help in explaining the content.	Appropriate.	No revision
7.	The color composition used is interesting.	Appropriate.	No revision
8.	The design layout is proportional and interesting.	Yes, proportional.	No revision
9.	The content presented is consistent with the competencies to be achieved.	Appropriate.	No revision
10.	The content presented follows the curriculum used.	Appropriate.	No revision
11.	The content presented is completed	Appropriate.	No revision
12.	The content is presented systematically	Appropriate.	No revision
13.	The textbook is predicted to be able to drive students' motivation.	Yes, activities contained could drive students' motivation..	No revision

Based on [Table 5](#), all improvements had been conducted according to the previous validation; therefore no suggestions and improvements from the validators in the second validation, and the product was stated valid.

### Implementation Stage

The implementation stage was conducted through a product trial for small and large groups. The trial was started with the small group and continued with the large group after the product passed the validation of content and media experts.

#### a. Data of Small Group Trial Results

Upon the revision of the product according to the expert suggestions, the trial was carried out in a small group that consisted of 6 students to generate suggestions and inputs to improve the product quality. Data of the trial results were collected using a student questionnaire with a "Yes" or "No" answer along with the reason for each response. The students' responses became an input to improve the developed product. The students' comments and suggestions are presented in [Table 6](#).



**Table 6.**

Data of Students' Response to the Textbook in a Small Group Trial

No.	Name Code	Percentage	Category	Overall Comment and Input
1.	RS	92.00	Excellent	The book is excellent. It feels easier for me to learn the principles and process of biology learning.
2.	AS	87.50	Excellent	The book has an interesting display and it helps in understanding the content. My suggestion is to add more images to make it easier to understand.
3.	ES	75.00	Good	The book is good, learning becomes easy to understand. It is better to add activities for the student.
4.	AH	87.50	Excellent	The book is excellent that motivates to learn
5.	RKD	62.50	Excellent	The book is quite good but the creation has not motivated me to study it.
6.	HM	87.50	Excellent	The book is good and detail. However, the size should be enlarged so it will not be too thick.

The product validation of the Principles and Processes of Biology Learning textbook resulted in data of suggestions and inputs from experts to improve the developed textbook quality and determine the feasibility of the textbook. Suggestions and inputs given by the experts become a basis to revise the product to obtain the best product.

Suggestions and inputs from the expert were that the book should be equipped with the authors' biography, uses fewer types of font, the image size should be relatively similar, all images should have a description so it is easier to understand, tables should have color to make them more interesting, the book page writing should be improved, content on props is less detailed, and content about laboratory management should be arranged more systematically. The authors accepted all suggestions and inputs to produce a feasible and good textbook.

To generate suggestions and inputs from students on the developed product, the research carried out a small group trial that involved 6 students. The trial lasted around 60 minutes outside the lecture hour. In the trial, students read some content in the textbook. They were then asked to fill out a questionnaire and gave suggestions and inputs that would be used as improvement materials before the product was tested on a larger scale. Skill to ask a question in microteaching will equip the pre-service teachers (Helda et al., 2020).

The student response questionnaire consisted of 10 questions with a "Yes" or "No" answer along with the reason. Of the 6 students, 5 students indicated a positive response where 1 of them had 100% percentage (excellent), 3 students had 87.5% (good), and 1 student had 75% (good), whereas 1 student had a negative response with a percentage of 62.5% (poor). Suggestions from the students included adding more images so they could easy to understand the content, adding activities for students so they will be more motivated to study, and enlarging the book size so it will have fewer page. the authors accepted the suggestion and performed revisions based on them.

#### b. Data of the Large Group Trial Results

Once the product was revised according to the experts' suggestions, a large group trial was carried out that involved 10 students to generate suggestions and inputs to improve the product quality. Data of the trial results were collected using a student response questionnaire with questions that have a "Yes" or "No" answer along with reasons for each answer. The students' answers became an input for the developed product improvement. Comments and suggestions from the students are presented in Table 7.

**Table 7.**

Data of Students' Response to the Textbook in Large Group Trial

No.	Name Code	Percentage	Category	Overall Comment and Suggestion
1.	RS	93.00	Excellent	The book is excellent. It seems easy for me to study the microteaching course
2.	AS	88.50	Good	The book has an interesting display and it helps in understanding the content.
3.	ES	85.00	Good	The book is excellent, learning becomes easy to understand. It would be better to add activities for students.
4.	AH	87.50	Good	The book is excellent and increases motivation to study
5.	RKD	82.50	Good	The book can motivate learning
6.	HM	87.50	Good	The book is good and detailed. However, the book size should be enlarged so it is not too thick.
7.	DW	85.00	Good	The book is good and can be used as a reference
8.	AW	87.50	Good	The book provides appropriate concepts

No.	Name Code	Percentage	Category	Overall Comment and Suggestion
9.	RS	85.00	Good	The book is good but it needs more examples
10.	EL	89.00	Good	The book provides sufficient knowledge

The product validation of the Principles and Processes of Biology Learning textbook resulted in data in the form of suggestions and inputs from the expert to improve the developed textbook quality and to determine the feasibility of the textbook. The suggestions and inputs became a basis for product revision to produce the best product.

The experts' suggestions and inputs consisted of the book must be equipped with the authors' biography, avoid using many types of font, the size of the images should be relatively similar, all images must have a description so it is easier to understand, tables should have color to make them more interesting, the book page writing should be improved to make it more interesting, content on props is less detailed and content for laboratory management should be arranged systematically. All suggestions and inputs were accepted by the authors to obtain a feasible and good textbook.

In this research, a large group trial was conducted to gain suggestions and input from the students on the developed product that involved 10 students. The trial lasted around 60 minutes outside the lecture hour. In this trial, students read some content in the textbook. Next, students were asked to fill out a questionnaire and provide suggestions and inputs that would be used as improvement material before the product was tested on a larger scale. A digital-based microteaching is necessary for the development of the current microteaching approach (Pandey 2019). It is expected that the book will provide a new understanding of microteaching in a virtual class. Pre-service students might perceive blended learning as difficult since they are not familiar with microteaching learning from contextual face-to-face to virtual classes (Ledger & Fischetti, 2020).

Suggestions from the students included adding more images so they could easy to understand the content, adding activities for students so they will be more motivated to study, and enlarging the book size so it has a fewer page. The authors accepted the suggestion and performed revisions based on them. The pre-service students will receive knowledge of microteaching so they could practice it in the classroom (Koesoemo & Shore, 2015).

Obstacles faced by the authors in developing the product of the microteaching book were in determining what competencies to be loaded in the book, searching for sources relevant to the book content, information on microteaching models from various countries, and comparing them to the microteaching model in Indonesia. Solutions provided by the authors in coping with the obstacles was by reading as many books and journals as possible that related to microteaching models from various countries.

### Evaluation

In this stage, an evaluation was conducted on the microteaching book product that had been developed into learning. The evaluation aimed at testing the effectiveness of the book in classroom microteaching. Based on the activities conducted in the classroom, the microteaching book could improve students' learning achievement. The average pretest score of the students had increased from 65 to 75 after the posttest was conducted. This indicates that the microteaching book could improve learning outcomes and is effective to be used in the classroom. Today's microteaching faces digital challenges due to the industrial revolution 4.0; therefore, microteaching is required to be able to manage the class virtually. It is no longer a face-to-face classroom since digital, internet, teachers, and students have become one in digital-based learning (Azrai et al., 2020). Traditional microteaching is left behind and replaced with a blended learning-based microteaching that enhances students' performance and satisfaction (Yang, 2020). Skills to provide stimulus to students is crucial in learning despite their shortcomings in the practice (Khan et al., 2020). The microteaching book is useful for pre-service teachers to understand the microteaching stages and their assessment (Padmadewi & Artini, 2019).

### CONCLUSION

The research concluded that (1) the results of the expert validation indicate that the developed microteaching book is feasible to be used. This is similar to research by Padmadewi dan Artini stating that a microteaching book is needed to assist pre-service biology teachers' understanding (Padmadewi & Artini, 2019). (2) The analysis results of the small group trial suggest that the developed textbook is in a good category (87.5), whereas in the large group trial, the score obtained was 86.55 (good). Suggestion from the research is that the developed textbook can be tested for its effectiveness against several variables, such as students' learning activity, learning motivation, or learning outcome. The textbook can be developed in other forms, such as an ebook or digital book for practicality.

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