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Development of a Lichens Pocketbook in Low-Level Organism Taxonomy Course

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ABSTRACT

The Lichens Pocketbook is a vital teaching medium in Low-Level Organism Taxonomy courses. It contains conceptual materials to support students' understanding of achieving learning objectives. Therefore, this study aims to determine the results of the assessment and responses of material expert validators on the feasibility of the Lichens Pocketbook; find out the results of assessments and responses of material expert validators on the feasibility of the Lichens Pocketbook; find out the results of the assessment and responses of design expert validators on the feasibility of the Lichens Pocketbook. This pocketbook was developed according to the Thiagarajan (4-D) model, limited up to the development stage. The analysis showed that the developed Lichens Pocketbook was declared feasible based on the material experts' validation with an average value of 92.48% within the excellent feasible categories. The validation results from learning expert validators obtained an average of 83.88% within the excellent and feasible categories. Lastly, the validation results from design expert validators obtained an average value of 90.89% within the excellent and feasible categories. Thus, the developed Lichens Pocketbook can be used in learning.

Pengembangan Buku Saku Lichens Pada Mata Kuliah Taksonomi Organisme Tingkat Rendah

ABSTRAK: *Buku saku lichens merupakan media ajar yang penting dalam perkuliahan Taksonomi Organisme Tingkat Rendah. Hal ini dikarenakan, buku saku tersebut memuat rangkaian materi konseptual yang dapat mendukung pemahaman peserta didik dalam mencapai tujuan pembelajaran. Berdasarkan hal tersebut penelitian ini bertujuan untuk mengetahui hasil penilaian dan tanggapan validator ahli materi terhadap kelayakan buku saku pada materi lichens, mengetahui hasil penilaian dan tanggapan validator ahli pembelajaran terhadap kelayakan buku saku pada materi lichens dan mengetahui hasil penilaian dan tanggapan validator ahli desain terhadap kelayakan buku saku pada materi lichens. Buku saku ini dikembangkan menurut model Thiagarajan (4-D) yang dibatasi hingga tahap pengembangan. Hasil validasi dari ahli materi memperoleh nilai rata-rata 92,48 % dengan kategori layak, hasil validasi dari ahli pembelajaran memperoleh nilai rata-rata 83,88 % dengan kategori layak, dan hasil validasi dari ahli desain memperoleh nilai rata-rata 90,89 % dengan kategori layak. Dengan demikian, dapat disimpulkan buku tersebut dapat digunakan dalam pembelajaran.*

INTRODUCTION

Lichens are one of the topics studied in the low-level organisms taxonomy in the Biology Department at Medan State University. Lichen is a symbiont organism beneficial to the environment. Lichen is formed from a symbiosis between fungi (mycobiont) of the Ascomycetes and Basidiomycetes and algae (phycobiont) from the Cyanobacteria or Chlorophyceae group. Corticolous forms of lichens are living lichens as epiphytes on the bark substrate (Matos et al., 2019; Goga et al., 2021). Living lichens are attached to shady trees as a substrate (Hawksworth & Grube, 2020; Solárová et al., 2020; Spribille et al., 2020; Yang et al., 2021).

Knowledge of lichens and their role in everyday life is a competency that students studying lichens material must achieve; thus, requiring printed media in the form of the contents of the material contained in books that must keep abreast of current developments in science and technology (Windayani et al., 2018; Suryanda et al., 2019; Aprilia, 2021). This issue leads to learning outcomes based on the parameters of the Indonesian National Qualifications Framework (KKNI) so that students can recognize and understand the lichens, can apply them to solve problems in society, have a strong will and the ability to follow scientific developments, and have adequate life skills (Fitriani et al., 2019; Aji & Wahyuni, 2021; Chairunnisa et al., 2021).

Based on interviews with biology students when taking Taxonomy of low-level organisms, they experienced difficulties in learning lichen material because they did not have other reference books besides the lecturer's handbook. Furthermore, the student handbook for practicum was distributed with few pictures of lichens and limited descriptions. According to Sari et al. (2021), teachers, lecturers, and students must read various types of additional reading sources relevant to teaching and learning. One of the lichens books is used as a learning resource in the teaching and learning process. Lichens books can provide concrete learning experiences to achieve learning objectives effectively and efficiently (Suryanda et al., 2020; Feng et al., 2020; Wang et al., 2021). Furthermore, Nurutstsany et al. (2020) claim that biology books generally only describe a few known species, although it turns out that the number of lichens reaches 40,000 species.

The interviews conclude that the students need additional reading sources with a more attractive appearance in terms of image display, word choice, and content material that students can easily understand in overcoming the difficulties. An alternative solution that can be given is to use a pocketbook as an additional learning media in studying, clarifying, and deepening with more accurate information. Pocketbooks are used to convey information about the subject matter and others that are one-way in nature so that they can develop readers' potential independently (Windayani et al., 2018). This theory agrees with Haka et al. (2020) that media will greatly help teachers deliver material to students to be loaded according to students' needs to learn independently. Apart from being easy to carry and study at any time, pocketbooks contain messages or information briefly but with proper clarity and are accompanied by pictures or illustrations that interest the reader (Awaludin & Rostikawati, 2020).

The developed pocketbook in this research comprised results of tracing lichens directly in the field to obtain real and accurate findings. This statement is reinforced by Arafa et al. (2021), stating that through the development of research-based textbooks, it is hoped that students find out about the latest research findings and developments related to the material being discussed. Besides, the research results are compiled in textbooks as learning resources that can provide real experiences for students. The results of the assessment and responses of the material, learning, and design experts are focused on the feasibility of the Lichens Pocketbook.

METHODS

This research was conducted at Medan State University. It employed the 4-D development model by Thiagarajan, which is limited to the development stage (Trianto, 2009). The research procedure carried out to produce the Lichens Pocketbook for biology students has several stages: (1) define, (2) design, and (3) develop (González-Henríquez et al., 2019).

The Define stage began with determining the basic problem obtained from student interviews. At the design stage, the pocketbook was compiled and designed. After the initial pocketbook product had been produced, then at the development stage, it was validated by a team of experts, including material, learning, and design experts. At this stage, the experts were asked to provide suggestions for improvement and provide an assessment by filling out a questionnaire with a Likert scale with a score of 5-1, with the following description: 5 means excellent, 4 means high, 3 means moderate, 2 means low, and 1 means poor (Jain, et al., 2010; Farrell et al., 2019; Smith et al., 2020). The result of the assessment was converted into a percentage.

$$\text{Score Percentage} = \frac{Total\ score\ obtained}{Total\ ideal\ score} \text{ x } 100\ \%$$

The feasibility percentage criteria for the pocketbook in each aspect consisted of a scale range of 81 ≤ % score ≤ 100 with excellent criteria and feasible category, a scale range of 61 ≤ % score ≤ 80 with high criteria and a fairly feasible category, a scale range of 41 ≤ % score ≤ 60 with moderate criteria and the category is not feasible, the scale range is 21 ≤ % score ≤ 40 with low criteria and the category is not feasible, and the scale range 0 ≤ % score ≤ 20 with poor criteria and the category is not feasible (Riduwan, 2015; Mukhoyyaroh et al., 2022, 2022; Audriansyah et al., 2022).

RESULTS AND DISCUSSION

Material experts first validated the pocketbook. Material experts validated the Lichens Pocketbook by material experts in useful scores as data to be converted into percentages and adjusted according to criteria and categories. These criteria and categories were used to improve product quality. The aspects assessed by material experts were the feasibility of the material's content, the feasibility of presentation, and the feasibility of graphics. The revision made on the pocketbook based on the material expert validation was the title of the book on the cover, in the first line of Lichens, and on the next line, the addition of a small title containing basic information to make the pocketbook, namely "Pocketbook in Learning Low-Level Organism Taxonomy" and the author's name. It also added to the image identity. After the product has been revised and validated based on the advice of material experts, the assessment data obtained through the questionnaire will be converted into a percentage to obtain the criteria and categories for evaluating the product. The results of the product assessment by material experts on the Lichens Pocketbook can be seen in Table 1 below.

Table 1. Assessment Results by Material Experts

Aspects/Indicators	Appraisal Percentage (%)	Criteria	Category
Feasibility of the content of the material	88,57 %	Excellent	Feasible
Presentation feasibility	88.88 %	Excellent	Feasible
Graphical feasibility	87,65 %	Excellent	Feasible
Average Total Rating	88,36 %	Excellent	Feasible

Based on Table 1. the results of the assessment of material experts who assessed Lichens Pocketbook products, it is known that the percentage of assessments from material experts is in excellent criteria and is categorized as feasible with an average total rating of 92.48%, as for the details on the assessment of the feasibility aspect of the material content with a percentage of

88.57% in excellent criteria and categorized as feasible, the assessment of the feasibility aspect of presentation gets a percentage of 88.88% in excellent criteria and is categorized as feasible, and graphical feasibility aspects get a percentage of 100% with excellent criteria and feasible category. Furthermore, Yang et al. (2021) said that book products that have been declared high by the validator must still be improved according to the advice of experts.

Pocketbooks are very important in learning. This idea is in line with Reis et al., 2022 that pocketbooks can explore the ideas of students they meet through the presentation of the information provided. Alizadeh & Ebrahimzadeh (2022) emphasized that pocketbooks can stimulate students' activeness in learning because these books present communicative pictures and illustrations and attractive colors. Narayanan et al. (2021) also explained that pocketbooks could effectively stimulate students' knowledge because they present applicable material closely related to their daily lives.

Hidrasti, et al (2020) said that descriptions of material presented narratively could stimulate and condition the growth of learning experiences, and illustrations and pictures are important for facilitating understanding of learning material. Furthermore, Handayani (2020) & Supit et al. (2022) said that a high book should present material following the principles of learning to have high legibility so that it is easy to understand and understand. The format of the book and graphics is attractive.

The characteristics of the material presented in the book can improve students' way of thinking. The same thing was stated by Yolida et al. (2022) that the presentation of material in a Biology pocketbook could improve students' cognitive development. Aprillia et al. (2022) added that the continuity of concepts and material in a Biology pocketbook could affect students' ability and understanding of the material being studied. Furthermore, Safitri et al. (2022) also reported that a high presentation of material in a Biology pocketbook has implications for a coherent mental representation of the material's content. This idea most underlies the need for a high level of presentation of material in a Biology pocketbook.

Expert validation of Lichens Pocketbook learning was carried out by a team of experts, with the assessment results obtained in the form of useful scores as data which would then be converted into percent and adjusted to criteria and categories. These criteria and categories are used to improve product quality. The aspects assessed by learning experts are the feasibility of the material's content, the feasibility of presentation, and the feasibility of graphics. As for pocketbook improvements, namely, the font size is adjusted to the pocketbook's size, reducing color variations. After the product has been revised and validated based on the advice of learning experts, the assessment data obtained through the questionnaire will be converted into a percentage so that the criteria and categories for evaluating the product are obtained. The results of product assessment by learning experts on Lichens Pocketbook can be seen in Table 2.

Table 2. Assessment Results by Learning Experts

Aspects/Indicators	Appraisal Percentage (%)	Criteria	Category
Feasibility of the content of the material	85 %	Excellent	Feasible
Presentation feasibility	81,66 %	Excellent	Feasible
Graphical feasibility	85 %	Excellent	Feasible
Average Total Rating	83,88 %	Excellent	Feasible

Based on Table 2. the results of the assessment of learning experts who assessed Lichens Pocketbook products, it is known that the percentage of assessment from

learning experts is in excellent criteria and is categorized as feasible with an average total rating of 83.88%, as for the details on the assessment of the feasibility aspect of the material content with a percentage of 85% in excellent criteria and categorized as feasible, the presentation feasibility aspect assessment got a percentage of 81.66% in excellent criteria. They were categorized as feasible, and graphical feasibility aspects got a percentage of 85% with excellent criteria and feasible category. According to Zega (2019) & Sari et al., 2020 with an assessment from learning experts, it is hoped that the products that have been developed can be used in the learning process, especially so that the lichen learning objectives developed can be achieved and learning becomes more effective and efficient.

The feasibility of the graphic content of the material in the Biology pocketbook greatly influences the achievement of learning objectives. This idea is supported by Haka et al. (2021), who state that graphics can clarify the appearance and representation of the material. Rosdiana (2021) clarifies that high material representation can strengthen students' mastery of the material because they are guided in the high mastery of the material. Mujtaba et al. (2019) also emphasized that graphics in biology teaching media contains the essence of phenomena and factual concepts of material content. It can help students master the material with a high level of understanding.

The validation of the Lichens Pocketbook design expert is carried out by an assessment which is obtained in the form of a useful score as data which will then be converted into a percent and adjusted to the criteria and categories. These criteria and categories are used to improve product quality. The aspects assessed by design experts are presentation feasibility and graphic feasibility. As for the improvements from the design experts, namely, the background with lichens on the front cover was changed to a plain background, and the background color in several titles was removed. After the product has been revised and validated based on expert design advice, the assessment data obtained through the questionnaire will be converted into a percentage to obtain the criteria and category for evaluating the product. The results of the product assessment by design experts on the Lichens Pocketbook can be seen in Table 3.

Table 3. Assessment Results by Design Experts

Aspects/Indicators	Appraisal Percentage (%)	Criteria	Category
Presentation feasibility	87,5 %	Excellent	Feasible
Graphical feasibility	94,28 %	Excellent	Feasible
Average total rating	90,89 %	Excellent	Feasible

Based on Table 3. the assessment results of design experts who assessed Lichens Pocketbook products, it is known that the percentage of assessment from learning experts is in excellent criteria and is categorized as feasible with an average total rating of 90.89%. In comparison, the details on the assessment of the feasibility aspect of the presentation get a percentage of 87.5% in excellent criteria and are categorized as feasible. The graphical feasibility aspect gets 94.28% with excellent criteria and is a feasible category. Anas & Murti, 2021 explained that a high book must motivate readers by utilizing interesting things such as pictures and illustrations that can support the learning process. The same thing was stated by Utami et al. (2021) that a high Biology pocketbook could support a valuable learning process. Khalifah et al., 2021 also explained that integrative Biology pocketbooks could facilitate students' knowledge of the studied material.

CONCLUSION AND SUGESTION

The Lichens Pocketbook in the Low-Level Organisms Taxonomy course was declared feasible, based on the results of validation from material experts obtaining an

average score of 92.48% with excellent and feasible category. The validation results from learning experts obtained an average value of 83.88% with excellent and feasible categories. Lastly, the validation results from design experts obtained an average value of 90.89% with excellent and feasible categories.

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