Analysis of the Quality of Local Potential-Based Invertebrate Preservation Media for Invertebrate Taxonomy Course

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ABSTRACT. Instructional media play a vital role in improving the quality of a learning process, especially in helping the students to learn. Local-potential instructional media are expected to be able to motivate university students to learn preservation methods of invertebrates. However, the quality of the media should be number one priority. This study aimed to examine the quality of instructional media developed in the form of fluid-preserved or wet specimens which were stored in alcohol and formalin. This study used a descriptive approach to data analysis. A comparative analysis of experimental results was performed in this study. The media were evaluated based on the following aspects: compliance with the curriculum standard, quality of the materials, language use, presentation, intelligibility, and benefits of the media. The data were collected using a documentation method and analyzed using a qualitative data analysis technique. The result of the analysis showed that the media complied with the Indonesian National Qualification Framework (KKNI) curriculum standard competencies. In addition, the media also obtained high scores in the quality of the materials, language use, presentation, intelligibility, and benefits (95.78%, 98%, 96.20%, 95.40%, and 97.60%, respectively). Overall, the invertebrate preservation media analyzed in this study have been qualified as proper media to support learning in the classroom.

1. Introduction

Education plays a major role in shaping future generations. To realize high quality education, students must have high learning motivation and satisfying learning outcomes. The quality of instructional media is one of the most influential factors in increasing student learning motivation. The optimal use of instructional media can facilitate students’ understanding of the subject matter. Instructional media aid the teachers or lecturers to implement methods for teaching. Through the use of media, it is hoped that the quality of a teaching and learning process can improve, so the quality of student learning can also be refined. In an Invertebrate Taxonomy course, instructional media in the form of animal specimens are extremely needed to support the learning process [1].

One thing that is major and challenging in deciding the design of teaching is to determine the medium or media that can be used to convey teaching [2]. Determination of the media to be used is based on what will be taught, how to be taught and how it will be evaluated and who will be students. Therefore, the professional abilities of teachers must be improved, because in turn will have a positive impact on improving the quality of the process and learning outcomes. With the presence of educational media, it is hoped that the presentation of learning material more clearly is not verbalistic. Interesting examples of facts, data, images, graphics, photos or videos with or without sound make learning activities more...
interesting. The materials can be presented with a series of events that are simplified or enriched so that learning activities are not a boring description of students.

Invertebrate is one of the compulsory subjects studied by Biology students at Universitas Negeri Medan. Invertebrate is the study of the characteristics of animals that do not possess a vertebral column or a backbone. Invertebrate study coverage is quite broad and complicated. It also contains a lot of scientific language use. A large number of species in Invertebrate are classified into phyla. Each sample species in Phylum has many similarities and differences. These complex concepts frequently confuse students; therefore, the students often consider Invertebrate subject difficult. The majority of Invertebrate species can only be found in seas; thus, it is difficult for the students to observe them. The solution to this issue is to provide preserved invertebrate specimens that are available in the laboratory. Based on the background, it is necessary to analyze the quality of Invertebrate instructional media in the form of preserved animal specimens developed in the Biology Laboratory of Universitas Negeri Medan.

2. Research Methods

The current study was designed as a descriptive research report using a comparative analysis method on experiment results. The marine invertebrate samples were collected along the western and eastern coasts of North Sumatera. The collected samples were preserved in alcohol and transferred to the Biology Laboratory of Universitas Negeri Medan for specimen identification. An in-depth analysis was performed to determine the quality of the instructional media based on the following aspects: compliance with the curriculum standard, quality of the materials, language use, presentation, intelligibility, and benefits. Data collection was conducted using a documentation method and analyzed qualitatively.

3. Results and Discussion

3.1. The Compliance of the Media with the Indonesian National Qualification Framework (KKNI) Curriculum Standard Competencies for Invertebrate Taxonomy

At the end of the Invertebrate Taxonomy course, the students are expected to be able to understand biology principles and application. This learning outcome is broken down into several indicators, including classifying invertebrates, explaining the invertebrate binomial nomenclature system, identifying invertebrate characteristics, describing invertebrate diversity and phylogeny, applying a simple dichotomous/determination key for identifying invertebrates. The result of the analysis of the media compliance is presented in Table 1.

Table 1. The Result of the Compliance of the Media with KKNI-Based Curriculum Standard Competencies

| No | Standard Competency                                                                 | Learning Indicator                                                                 | Indicator of Invertebrate Preservation Media                                      |
|----|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 1  | Using the International Commission on Zoological Nomenclature (ICZN) system for invertebrate classification | Applying the principles of animal classification principles, binomial nomenclature system, and taxonomic classification | Applying the principles of invertebrate classification                             |
| 2  | Observing animal morphology, anatomy, and physiology                                | Classifying invertebrates into taxonomic ranks based on morphology, anatomy, physiology, and specific characteristics observations | Classifying invertebrates into taxonomic ranks based on morphology, anatomy, physiology, and specific characteristics observations by applying a simple... |
3 Describing the role of invertebrates in life

Based on the result of the analysis, it can be concluded that the instructional media used for classifying marine invertebrates found on the eastern and western coasts of North Sumatera are in line with the KKN-Based Curriculum Standard Competencies.

According to the instructional media should be properly adjusted to the learning methods that are going to be implemented in the classroom [3]. The teacher or lecturer should ensure the compatibility of the instructional media with the learning materials and methods.

3.2. Expert Validation on the Quality of the Invertebrate Preservation Media

Two experts were invited to validate the instructional invertebrate preservation media. The expert validation was conducted by two lecturers who have expertise in learning materials and media. Five aspects evaluated by the experts included the conformity, presentation, language, ease of use, and benefits of the media. The result of the expert validation was summarized in Table 2.

| No | Evaluated Aspect | Invertebrate Preservation Media | Average Score | Category |
|----|------------------|---------------------------------|---------------|----------|
|    |                  | Expert in materials | Expert in media |               |
| 1  | Conformity       | 94,8               | 96,76            | 95,78     | Good     |
| 2  | Presentation     | 98,5               | 97,5             | 98        | Good     |
| 3  | Language         | 94,8               | 97,6             | 96,20     | Good     |
| 4  | Ease of Use      | 95,2               | 95,6             | 95,40     | Good     |
| 5  | Benefits         | 96,5               | 98,7             | 97,60     | Good     |
|    | Total            |                    |                  | 96,59     | Good     |

Table 2 showed that the quality of the Invertebrate Preservation media was categorized good with a score of 96.59. The conformity, presentation, language, ease of use, and benefits of the media also fell into good category with scores of 95.78, 98, 96.20, 95.40, and 97.60, respectively; hence, the use of the Invertebrate Preservation media is highly advisable.

Instructional media should be able to improve student learning motivation and stimulate student memory. Proper instructional media can encourage students to provide positive responses, feedback, and attitudes toward learning. Therefore, visual instructional media are more effective than audio instructional media in supporting the achievement of learning objectives [4]. In addition, instructional media can also help students understand certain concepts and gain new learning experiences through active participation in the learning process [5].

Instructional media should be safe, portable, and user-friendly [6]. Fluid-preserved or wet specimens are very beneficial for learning because they can explain animal body parts in detail so that the students can distinguish various species based on their divisions.

Table 3. The Conformity of the Invertebrate Preservation Materials with the Curriculum Standard Materials
No | Standard Competency | KKNI Curriculum Standard Materials | Materials Presented in the Invertebrate Preservation Media | Remarks |
--- | --- | --- | --- | --- |
1 | Using the International Commission on Zoological Nomenclature (ICZN) system for invertebrate classification | General characteristics of invertebrates | Explanations on the general characteristics of invertebrates | Covered |
|  |  | Invertebrate characteristics and classification | Wet specimens classification based on invertebrate classification | Covered |
2 | Observing animal morphology, anatomy, and physiology | Invertebrate morphological and anatomical characteristics | Wet specimens classification into several phyla | Covered |
3 | Describing the role of invertebrates in life | The role of invertebrates in life | Explanations on the purpose of invertebrate preservation and on the animals’ locations and habitats | Covered |

The result of the analysis suggests that the materials presented in the Invertebrate Preservation media have met the criteria of KKNI curriculum standard materials. Argues that a simple instructional medium such as a preserved specimen contains the following qualities: it provides a hands-on experience, it presents a concrete visualization of an object, it helps reduce verbalism, it shows a clear picture of an object, and due to its portability traits, it can be simply brought into the classroom [7]. The real objects possess a unique value as an instructional medium. Both modified and unmodified preserved specimens can be used to deliver learning materials [8]. However, unmodified specimens are more accessible in nature and more effective in bridging situation gaps in learning. Asserts that preserved specimens can be used as realia to support learning. Realia can provide students with hands-on experiences. They can be found around schools or students’ surrounding environments. They also function to overcome the difference between classroom learning situations and real life situations.

Other benefits of preserved specimens as instructional media are also suggested [9]. Since preserved specimens can be observed with the unaided eye, the students can gain more meaningful experiences and more motivation in learning. Preserved specimens can also help the teacher present materials in a real-life context, deal with the limited space issue, and save time and energy. Preserved specimens are also environmentally friendly. Specimen preservation can maintain the original properties of an animal species, including its structure, shape, and even color [10]. Fluid-preserved specimens or herbarium are easy to make, depending on the availability the preservative solutions and containers. The results of this study indicate that the local potential-based Invertebrate Preservation media developed for the Invertebrate Taxonomy course have high quality attributes to support learning for university students.

4. References

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