



# The Utilization of Rusip's Local Culture as a Distanced Learning Media in Biological Lessons

M Ikhsan Al Ghazi<sup>1\*</sup>, Nurul Qomariyah<sup>1</sup>, Agung Wijaya Subiantoro<sup>1</sup>  
and Nur Aeni Ariyanti<sup>1</sup>

<sup>1</sup>Program of Biology Education, Yogyakarta State University, Indonesia.

## **Authors' contributions**

*This work was carried out in collaboration among all authors. Authors MIAG and NQ designed the study, collect and analyze data. Author MIAG wrote the first draft of the manuscript. Authors AWS and NAA mentor this research. All authors read and approved the final manuscript.*

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## **ABSTRACT**

**Aims:** This study aims to explore the possibility of Rusip as a medium for distance learning in biology subjects.

**Study design:** The research method used the literature review method.

**Place and duration of study:** Indonesia, between February 2021 and May 2021.

**Methodology:** In this study, researchers searched works of literature from multiple data search engines, namely research gate, google scholar, and Mendeley website. The keywords used to search for relevant documents are typing the word rusip, biology, learning media.

**Results:** The results showed that 1) the use of rusip as a media for learning biology is more suitable for teaching materials that contain the theme of fermentation; 2) the rusip learning media can be presented as an e-module which predominantly presents a complete picture and description of each step in the making of rusip.

**Conclusion:** The rusip's local culture can be developed to be learning media in biological lesson

\*Corresponding author: Email: [alghazi707@gmail.com](mailto:alghazi707@gmail.com);

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## **1. INTRODUCTION**

Biology is one of the compulsory subjects for high school students in Indonesia [1]. The main focus of biology subjects is to teach science teaching materials as provisions for students in real life in the future. In addition to teaching science material, biology learning is expected to improve the outlook on life or philosophy of life, even the socio-cultural background of each society, as well as certain psychological thinking in accordance with the learning objectives [2]. To achieve this goal, the teacher has an essential role in striving for harmonious communication between every aspect of both the relationship between educators and students and between students with learning resources so that the learning process can run well [3].

Because of its characteristics, biology subjects adhere to the philosophy of realism education, where the learning process will be more effective if students can directly observe the values of the subject objects that can be seen now [4], so biology learning requires learning media that can be seen directly by the students. Therefore, every biology teacher should ideally have various abilities in implementing classroom management [5], as well as developing relevant biology teaching materials [1], so that learning objectives can be achieved effectively efficiently [6]. The ability of biology teachers to develop effective e-learning teaching materials is more needed in the era of the Covid-19 pandemic because learning during the Covid-19 pandemic, the majority of which was carried out online (distance learning). Changes in the face-to-face learning system to distance learning impact the need for teaching materials that need to be developed by the teacher to achieve learning objectives effectively even though the teacher cannot meet directly with students.

Teaching materials are an essential part of the learning process because teaching materials can help teachers and students to implement a directed teaching and learning process according to the learning objectives [7]. Teaching materials serve as an essential source of information for teachers and students. Therefore, teaching materials are necessary to be studied, examined, studied, and used as material to more easily learn the material being taught [6]. Innovative

teaching materials are all materials (both information, tools, and text) that are arranged systematically, which displays a complete figure of the competencies that will be mastered by students and used in the implementation of learning. Innovative teaching materials can be developed from a variety of resources around the school, both natural resources and cultural resources such as local culture in each region.

In distance learning, teaching materials are not limited to mass-printed textbooks. Still, they can be in the form of electronic modules that students can easily use anywhere and anytime [6]. The skills of teachers to be able to develop innovative teaching materials are the key to implementing more effective and efficient learning. Teaching materials can be developed by utilizing the various environmental potentials of each region, including diverse local cultures such as rusip.

Local culture [8], is one of the potential learning resources to help increase students' understanding of biology teaching materials so that the use of culture-based learning media also allows students to interact directly with their environment, which is ideal learning. Biology must involve the interaction between students and the object being studied. The interaction between students and learning objects can lead to the development of mental, sensory, and motor processes that can affect students' understanding of the basic concepts of the phenomena being studied [9].

As the largest archipelagic country globally, Indonesia has more than ten thousand islands that are scattered as large and small islands [10]. The geographic uniqueness of each region allows Indonesia to have a very high level of cultural diversity. The diversity of geographic and socio-cultural backgrounds can be explored and developed by the surrounding community. This also applies locally in Indonesia.

According to the Law of the Republic of Indonesia, Number 20 of 2003 concerning the National Education System Chapter X Article 36, curricula at all levels of education and types of education are developed based on the principle of diversification that is tailored to the educational unit, local potential, and the potential of students. This was also stated by [11], education functions to empower human potential to inherit, develop

and build future culture and civilization. Said to have a twin function, where on the one hand education functions to preserve positive cultural values and on the other hand education functions to create changes towards a more innovative life. Based on the statement put forward, Biology learning has the potential to become a container for preserving culture. This study seeks to explore the potential of Rushif's local culture as a medium for distance learning in biology subjects.

## **2. MATERIAL AND METHODS / EXPERIMENTAL DETAILS / METHODOLOGY**

This research uses the literature review method [12], a research method carried out through a study of various literature relevant to the topic of discussion. In this study, researchers searched works of literature from multiple data search engines, namely research gate, google scholar, and Mendeley websites. The number of journals studied was 14 journals with a period of publication between 2007 and 2020. The keywords used to search for relevant documents are by typing the word rusip, biology, learning media. The downloaded literature then analyzed the various potentials of rusip as a medium for learning biology.

### **2.1 Research context**

Indonesia is a vast maritime country, consisting of thousands of islands and thousands of local cultures in every part of its territory [13]. One of Indonesia's local cultures that can be used as teaching material in biology subjects is the rusip culture that originates from the islands of Bangka Belitung, Indonesia. Rusip is one of the fermented fish foods with the help of lactic acid bacteria typical of Bangka Belitung [14,15]. The essential ingredients that are often used to make rusip are small fish such as bilis and anchovies. This fermentation uses the help of lactic acid bacteria and palm sugar as a food source of lactic acid [14]. This study seeks to explore the use of rusip as teaching material for biology subjects in Indonesia.

Bangka Belitung Island is one of the islands located to the east of Sumatra Island, which is part of the Bangka Belitung Islands Province, which has an area of 11,693.54 KM<sup>2</sup>. Bangka Island means "old" or "very old," so it means an old island. Many minerals contain minerals that occur due to natural processes over millions of years. The word wangka is the origin of Bangka which means tin [16]. Based on fisheries

statistical data, Bangka Belitung Island Province has various fishery products, such as mackerel, flying fish, selar, tembang, snapper, grouper, black pomfret, white pomfret, yellowtail keris, bilis or anchovies, vanamei shrimp, tiger prawns [17].

Bangka Island has special foods, including bread, pineapple cake, hull, kericu, kemplang, pantiauw, tahukok, rusip. Processed food produced in every region in Indonesia known as traditional food is consumed to meet the food needs of the local community. One of them is the Province of Bangka Belitung Islands, which is an area that has traditional food, one of which is rusip. The typical food of the Bangka Belitung region that is produced in almost all areas of Bangka Belitung is rusip, which is done by fermentation [18].

## **3. RESULTS AND DISCUSSION**

### **3.1 Rusip Characteristics**

Rusip is a traditional food for the people of Bangka Island, in the form of chili sauce made from anchovy. One of the traditional products of the Bangka community. Almost all areas in Bangka produce, but the scale of cultivation is still small or home industry. In general, rusip is made on a household scale during the fishing season where this anchovy has a small body structure. According to [19] anchovy has advantages because all parts of its body can be consumed. In general, rusip products have the appearance of a whole fish that is starting to crumble, become cloudy, and runny. The characteristics of fermented products are gray and brown, salty and sour taste, and a fishy and sour aroma [20].

Rusip can be made with the addition of 25% salt and 10% palm sugar, where rusip is the result of fermentation that lasts for approximately 1-2 weeks anaerobically. The sensory characteristics of the resulting are thick, visible fish shape, brown to gray in color, sweet, rotten, and shrimp-flavored, with a salty and sour taste. According to [21], the function of palm sugar is as a source of energy and nutrition. Palm sugar is sugar made from palm tree sap or palm sugar. This source of energy and nutrition is needed by bacteria that play a role in the fermentation process. The fermentation process for rusip is carried out in a simple way. Traditional food processing has been known for a long time. One way of processing that is done is by fermentation. Fermentation is a process both aerobically and

anaerobically that produces various products that involve the activity of microorganisms or their extracts with controlled microorganism activity. Fermentation has various benefits, namely:

- a. To preserve food products,
- b. To give taste or flavor to certain food products,
- c. To give a particular texture to food products.

The fermentation process carried out by certain microorganisms is expected to increase the nutritional value of fermented products. Improving the quality of fermented food products is aimed at increasing the value of food received by consumers [22]. Fish fermentation is one method of applying the fermentation process to fishery products. Fermentation is a process of microorganisms such as bacteria that aims to convert substances in fish, such as sugar, into alcohol and acids (for example, lactic acid) and produces flavor substances such as esters or ketones. Typically, fermentation occurs in the absence of oxygen. The purpose of fish fermentation itself includes preserving fish, creating a new flavor substance, or changing its texture [23].

As for the research [24], the methods of making rusip spontaneously and not spontaneously are as follows:

- a. The first time anchovy (*Stolephorus*) was washed and drained.

- b. Then add salt as much as 25% of the weight of the fish and stir until blended.
- c. Next, add palm sugar as much as 10% of the weight of the fish and mix well.
- d. After that, it was incubated to be observed during the fermentation process.
- e. Meanwhile, the preparation of rusip was not spontaneous by adding a starter (liquid culture) mixture, namely *Streptococcus*, *Leuconostoc*, and *Lactobacillus*, as much as 2% of the weight of anchovies.
- f. Then put it in a plastic container. During the fermentation process, periodic observations were made on days 0, 2, 6, 8, 10, 12, and 14.

### 3.2 Analysis of Issues and Concepts

In terms of biology, the making of rusip utilizes the concept of fermentation in food [14]. The initial purpose of fermentation in rusip was to preserve the fish so that it could be stored longer, which then becomes a food reserve that is safe for consumption at a later date. Along with the change of times, fermented food preservation is different from food preservation by drying, cooling, heating, etc. Preservation by fermentation is intended to increase the number of microbes, while preservation by drying, etc., is just the opposite, namely reducing the number of microbes.

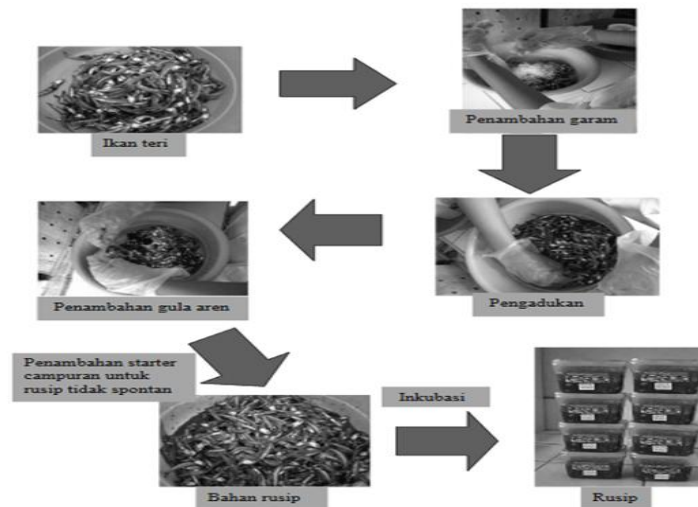


Fig. 1. Rusip Making Process [24]

The processing of rusip is still relatively simple, and the fermentation takes place spontaneously. According to [24], rusip is a fermentation product that uses a high enough salt content of 25%. This salt functions to suppress the growth of bacteria, especially putrefactive bacteria, and pathogens, through salt osmosis pressure so that the salt can lyse the microbial cell walls. In addition, the addition of palm sugar that has been melted beforehand will support the growth of lactic acid bacteria. This is because when palm sugar is heated, palm sugar will reduce its structure into a simpler form so that it is easier to use by lactic acid bacteria as an energy source for growth. The increase in total lactic acid bacteria during the fermentation process causes an increasingly acidic state which helps to select the number and types of microbes present in fish fermentation [25]. Microbes that cannot withstand acidic conditions will die, while microbes that can withstand acidic conditions will grow and grow well.

The preparation of rusip described is in accordance with the basic concept of fermentation, where fermentation will occur if the microbes that cause fermentation come into direct contact with the substrate (food) that is suitable for its growth. As a result of the fermentation of foodstuffs, they will experience changes in their properties. For example, soybeans will be easily digested after turning into tempeh, grape extract will taste alcoholic, glutinous rice will taste sweet mixed with alcohol, including the fermentation of rusip [26].

Fermentation products spontaneously have the number and types of microorganisms that are very large and difficult to control. Including lactic acid bacteria are often found naturally in food, especially fermented food. Lactic acid bacteria are a group of bacteria that break down carbohydrates (glucose) into lactic acid, which will lower the pH and cause a sour taste. Lactic acid bacteria have an essential role in almost all fermentation processes of food and beverages. Its primary role is to acidify the raw material by mainly producing lactic acid, a small portion of acetic acid, ethanol, and CO<sub>2</sub> [21].

According to the research results [27] showed that the lactic acid bacteria (LAB) involved on day 1-15 of the rusip fermentation process were *Streptococcus* at the beginning of fermentation, and *Lactococcus* began to appear in the middle of fermentation, while *Leuconostoc* was present

at the same time as the fermentation process take place. BAL activity resulted in changes in the nutritional value of the fermented rusip.

This is in line with the development of objectives, and the need for fermentation has shifted and is increasingly varied. Traditional fermentation usually aims to increase the storage capacity of agricultural products such as milk, vegetables, and meat, while modern era food fermentation has more complex goals such as adding flavor or improving the nutritional quality of food. In the development of the culture of Bangka Belitung, rusip is now better known as a fermented food that has a distinctive taste for Bangka Belitung culinary tourism, so the taste of rusip is one of the main goals of making rusip [28].

Changes in the taste sensed by the human tongue occur due to changes in the nutritional content of the fermented rusip. According to the research results [29] there is a change in the content of anchovies that have not been fermented and after being fermented. The changes in the nutritional content of rusip are undoubtedly caused by the activity of the bacteria present in rusip. Then the quality of the rusip is determined by various factors, namely the raw material for the fish, environmental conditions, and the bacteria that play a role in the fermentation.

### **3.3 Presentation of Rusip Teaching Materials in Distance Learning**

The existence of the 2019 Covid pandemic [30] requires everyone to limit social interactions to limit transmission of the coronavirus. Therefore, learning activities are focused on online-based distance learning [31], so that the electronic module has the opportunity to be easier to reach.

One of the main problems of learning biology in the pandemic era is the loss of relationships between students and the object of learning resources. To cover these problems, making e-media is the best alternative to help students more easily understand the lessons they are learning. In this context, rusip, which workflow has various standard steps, and shows various terms in the whole process of fermentation, can be made into an e-module that is easier to understand. The e-module regarding rusip can be equipped with pictures for each fermentation step and detailed descriptions of each element. Learning using modules in the form of print

media is considered less attractive and monotonous. This affects students' interest in using these learning media [32]. Therefore, the electronic module is expected to be an alternative answer to these problems, especially in relation to the richness of local culture that is closer to students' real lives.

#### 4. CONCLUSION

Based on the results of the literature analysis, it is known that rusip has great potential as an effective medium for learning biology because the characteristics of rusip, which have systematic work steps, will make it easier for participants to understand teaching materials. The use of rusip as a learning medium also has other advantages for the development of education because the development of rusip as a medium for learning biology also means preserving the potential of local culture from the Bangka region, Indonesia. The use of local culture as a medium of learning is one of the efforts to instill students' character based on culture [11].

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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