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Cultivating *Ficus carica* as a contextual learning approach: redesigning the science curriculum during a pandemic outbreak

Cultivating *Ficus carica* as a contextual learning approach: redesigning the science curriculum during a pandemic outbreak

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Abstract. The COVID-19 outbreak has affected the world of education, including science learning. This paper aims to reveal one of the practices of learning science from home using a contextual approach to the topic of cultivating *Ficus carica* plants. The research method uses field studies, project analysis, and interviews. The results showed that: (1) Through project-based learning, students can reveal a lot of scientific information related to the topics discussed (2) Selection of issues that are close to the context of everyday life makes it easier for students to learn (3) Learning science from home can support to achieve the learning outcomes of lectures. This research concludes the importance of redesigning a more adaptive and flexible science learning curriculum during a pandemic outbreak.

1. Introduction

The new coronavirus (COVID-19) outbreak has disrupted almost all aspects of human life, including education. COVID-19 has forced the world of education to do online learning. Online migration creates dysfunctionalities and disruptions to pedagogical and personal life. Therefore, there is an urgency for universities to formulate strategies and policies related to overcoming the impact of the COVID-19 crisis and also to make a consensus on future education programs [1]. COVID-19 is expected to inspire more universities to think about online education not as a lesser version of face-to-face instruction, but as a different way to reorganize education. This condition is expected to inspire higher education leaders to restructure education in the current context and needs in the future. It's time to rethink education from the interests of students and not just pursue curriculum implementation alone [2].

The implementation of lockdown and quarantine during the Covid-19 pandemic has forced academics to implement various strategies and approaches that are focused on learning from home. These fashion changes or transitions sometimes do not take economic, social, and technological inequalities into account. Home education leaves several problems, both pedagogically, teacher readiness, infrastructure readiness, and implementation of virtual learning. It is necessary to rethink more effective solutions to overcome some of the problems left by online learning [3].

It is undeniable that the COVID-19 pandemic is forcing universities to start a wide-ranging digital transformation suddenly and dramatically in society. The pandemic is forcing universities to take an extraordinary digital leap [4]. One of the applications of context-based Open Educational Resources

(OER) and Open Educational Practice (OEP) is expected to be used as a useful educational solution to address academic challenges during the Covid-19 pandemic [5]. This paper aims to show the process and results of implementing distance learning (learning from home) by utilizing the context-based OER and OEP method that is close to students. The learning context chosen was the process of cultivating fig *(Ficus carica),* which is used as traditional medicine.

2. Method

This research is the result of a student project who conducts lectures from home by conducting field studies in the area around the house where they live. The research location is a village in Karawang, West Java, Indonesia. The research subjects were figs farmers who became the primary data source. The research method is a direct observation that is strengthened by in-depth interviews. Furthermore, the results of observations and interviews will be confirmed and complemented by literature studies.

The activity of observation is focused on seeing firsthand the process of cultivating fig plants from beginning to end. The objective of the observation is to obtain authentic data and a complete picture of how to cultivate fig plants. Observations were also carried out in order to observe how to make tea from the fig plant, which is used for traditional medicine. Observation activities are seen as a suitable method for obtaining information, processes, physical evidence, products, and situations or events directly [6].

In-depth interviews were carried out to get a further explanation about the observed data through observation. Interviewing is seen as an appropriate method to get a complete description of the process and product being observed [7]. Interviews were conducted with key informants, namely fig farmers, and tea makers.

The literature study was carried out in two stages. The first stage is carried out before the research is conducted. The aim is to find a variety of complete information about the *Ficus carica* as well as to map previous studies. Literature studies were also carried out post-research in order to confirm the results of observations and interviews. Literature studies were also carried out in order to find and complement scientific studies on the process of cultivating fig plants and making tea which were the focus of this research. Literature studies have been shown to contribute significantly to complementing and systematizing each research domain [8].

3. Result and Discussion

There are many functions of plants for human life: a source of food, material for shelter, a source of oxygen, including restorative materials. In ancient times, many physicians processed herbs from various types of plants, which were used as a source of medicine. One example of a plant that is used as a source of treatment is *Ficus carica.* Taxonomically, this plant belongs to the *Moraceae* family. The most consuming part is the fruit, especially from the type of female. Apart from the fruit, other elements such as stems and leaves can also be used. *Ficus carica* is a plant that does not have a season and has fruit without flowers.

In the aspect of medicine, fig plants are proven to be able to overcome various diseases. The extracted *Ficus carica* leaves are more widely used than the fruit because fig leaves have a function to regenerate faster than the fruit or other parts. Fig leaves contain flavonoids and pectin. Flavonoids have the potential to be effective at relaxing blood vessels and preventing arteriosclerosis orders. At the same time, pectin has a bile secretion production system in the digestive tract. The mechanism of action of flavonoids and pectin above is thought to reduce cholesterol levels in the blood. *Ficus carica* leaves are also effective in helping to lower blood sugar levels. Plants also have various other health benefits as anticancer, antibacterial, can overcome hypolipidemic, can reduce high blood pressure, and can increase bone density [9]. Ficus carica was traditionally used to treat metabolic, cardiovascular, respiratory, antispasmodic, and anti-inflammatory diseases [10]. A review of the nutrition and pharmacological aspects of figs has been discussed by Al-Snafi [11, 12].

3.1. Cultivation of Ficus carica as traditional medicine

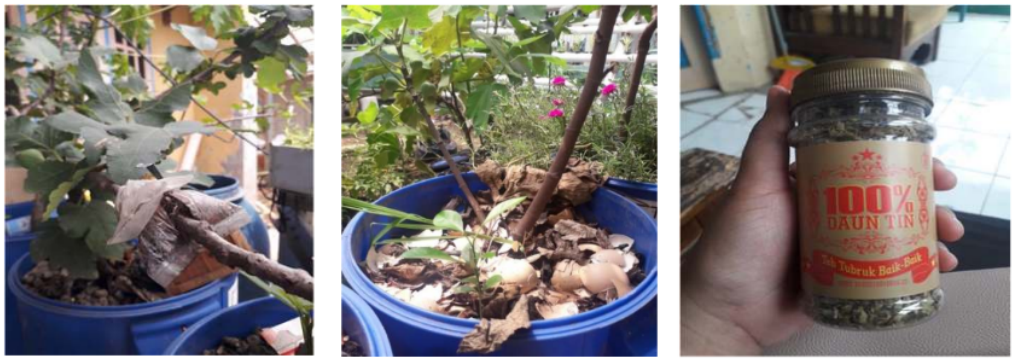
Given the many benefits of figs for various needs, cultivating figs for personal or family needs is one of the lessons. Seeds, cuttings, or grafts are ways of cultivating Ficus carica. Simple propagation methods such as cutting, and layering are the most recommended method used for cultivating the fig trees [13]. Figure 1.a shows one cultivated Ficus carica through a grafting process . However, selection by cuttings and grafts can be an option when cultivation with seeds is difficult to grow because it is difficult to find quality seeds.

Ficus carica is a plant native to the Middle East. In general, these plants can survive at high temperatures. However, certain species of fig plants can also adapt to tropical climates, such as Indonesia. The fig trees cultivated in Indonesia are brown Turkey, green Jordan, and purple Jordan. The difference in the tree is only visible from the type of fruit color; fruit and leaf sizes remain the same. Other types of fig trees, such as black ischia, panache tiger, flanders, conadria, long yellow, and negronne have different tree shapes, colors, and fruit sizes.

Cultivating fig trees is relatively easy to do, almost the same as plants in general. Watering can be done 1-2 times a day. Fig plants also really need a lot of sunlight. Fertilization on tin plants can be done with foliar fertilizers first. When the tree is two years old, use manure to speed up the fertilization process. Fertilizing the fig tree does not have to use expensive chemical fertilizers. However, you can use natural ingredients such as eggshells or banana peels. Figure 1.b shows the natural fertilization process. These natural ingredients are good enough for the growth of fig trees. Pests that often appear on fig trees are insects, including leaf-eating grasshoppers *(Atractomorpha crenulata)* and stem-eating animals (*Xystrocera festiva)*.

The fig tree is often referred to as the thousand benefits tree because most of the parts of the tree can be used for medicinal purposes, especially in the fruit, leaves, and roots. However, the part of the fig tree that is often consumed is the fruit, because besides being good for consumption, the fruit also contains many nutrients such as carbohydrates, protein, calcium, phosphorus, iron, magnesium folate, choline, vitamin E, and vitamin K. Fig fruit can be consumed in several ways. Besides being eaten directly, figs are also made dry or made sweets. There are many functions of the fig plant. The latex of the fig tree used with milk has been shown to treat skin problems [14].

Fig leaves are used as traditional medicine by making tea ready for brewing. Figure 1.c shows a tea product made from Ficus carica leaves. How to make tea from fig leaves: (1) Wash the fig leaves which are picked, (2) Dry them by drying in the sun or by using an oven, (3) After the leaves look dry brown, the leaves are cut small (4) Put the leaves in the jar. The fig leaf tea can be consumed for about one year. Processing fig leaves can also be done by direct leaf boiling [15, 16]. The leaves of fig are also likely to be used for the cosmetics industry and the treatment of several dermatological diseases [17].



(a) (b) (c)

Figure 1. a. Grafting process; b. Natural fertilization; c. Tea packaging

3.2. The physcical concept of processing Ficus carica leaves into traditional medicine
There are several physical concepts involved in the process of making tea from fig fruit. The concepts of physics include: temperature, heat radiation, pressure, and others.

3.2.1. Heat radiation. Drying is done to reduce the water content in the leaves so that the leaves can be preserved. One way of drying is to use solar radiation. When fig leaves are dried in the sun, there is an event of heat absorption (heat transfer by radiation). The heat obtained from sunlight radiation does not greatly change or reduce levels of compounds contained in foliage such as flavonoids.

3.2.2. Temperature. Temperature is a physical quantity that is highly considered when processing figs into traditional medicine. One is the temperature when drying in the oven and the temperature of the water when brewing tea. Temperature control is done so that the chemical content and properties of fig leaves are not reduced or lost. High temperatures can cause cells in fig leaves to become damaged. Drying done using an oven will result in lower flavonoid compounds compared to drying with sunlight. The nature of flavonoid compounds is easily oxidized when exposed to high temperatures. Decomposition of phenolic compounds increases with increasing temperature [18]. Drying temperature that is too high will cause a decrease in nutritional value and change the color of the dried product.

3.2.3. Time. Too long drying time can cause the tea to be brittle quickly, the smell and quality decrease. Conversely, if the time is used too quickly will result in the tea being dried not dry enough so that it cannot be stored for too long. Previous research has shown that wilting time and fig leaf conditions significantly influence the physical and chemical characteristics of tea. Normal leaves that wilt for 8 hours produce the best fig leaf tea [19]. The combination treatment of drying time and temperature affects physical and chemical properties but does not affect the sensory properties of fig tea steeping [20].

3.3. Learning process and Outcomes with Open Educational Resources (OER) and Open Educational Practice (OEP)
Project-based learning with a contextual approach that exploits the potential of learning around the home can be an option for Open Educational Practice (OEP) [21]. Some examples of learning can be seen in previous research [22]. Lesson plans that were planned from the start can be changed as needed [23]. In this case, students can determine the project topic to be chosen according to the area's potential around where they live. Practically, to understand the concepts, processes, and information related to the selected topic, students can search, read, study, and analyze various relevant sources through Open Educational Resources (OER) [24]. Lecturers can provide links to abundant learning resources on the internet or through social media such as twitter [25]. To ensure the effectiveness of teaching, the learning process can use WhatsApp media for group communication with the supervisor. Students are given the freedom to choose topics to be researched and discussed. WhatsApp groups can be used as a medium for discussion and exchange of information about projects being carried out. Regarding learning outcomes, lecturers can make general tasks and rubrics that can assess all student performance.

4. Conclusion
The COVID-19 pandemic demands flexibility in education delivery. Higher education institutions and lecturers are required to always be adaptive in carrying out effective learning by minimizing negative impacts. The selection of context-based Open Educational Resources (OER) and Open Educational Practice (OEP) can be used as an alternative for learning during the COVID-19 pandemic. Lecturers are given the flexibility to change the curriculum and learning according to circumstances.

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