

## Analysis of Learning Media for Plant Identification Using Plantamor-Assisted PlantNet on Plantae Materials as a Learning Media Innovation

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### Abstract

*Learning media can be used in the learning process to increase student attention, clarify information provided by the teacher, and avoid misconceptions so that the learning process is more interactive, effective, and able to increase student activity in learning. This study aims to analyze various technologies, namely plantNet and plantamor, as innovations in plant identification learning media. This study used a literature study research method with a narrative review design. The results of the analysis show that combining the PlantNet application as a tool for identifying plant species through pictures with the Plantamor website as a tool for validating the identification of plants found because it provides various information about the plants being identified will greatly assist students in learning and facilitate teachers in teaching. Thus, it will create fun for students and teachers.*

**Keywords:** Learning media innovation, PlantNet, Plantamor

### 1. Introduction

Education is a very important and beneficial thing for everyone is life because it is able to change the way of thinking and life of many people for the better so that education can form quality human beings (Indy, 2019). The current development of education emphasizes independent and effective learning. Through education, students have the opportunity to gain knowledge from their own understanding (Lahra et al., 2017). One type of education is biology. Biology education is a learning process that is able to develop the potential of students to interact with the real natural environment (Ayuni, Zunaena, Octaviani, Kristinah, & Juliati, 2018).

Education can be carried out through the learning process. Learning is a combination of teaching activities carried out by teachers and learning activities carried out by students. In learning activities, there is interaction between students and students or between teachers and students, and between students and learning resources. So, with this interaction, students can actively build knowledge (Hadija, Kapile, & Juraid, 2018). The spirit of student learning is one of the most important aspects of the learning process. Therefore, to foster students' enthusiasm for learning, teachers are required to make learning more interesting and innovative to encourage

students to learn optimally both in individual learning and in the learning process in the classroom (Yuliandari & Wahjudi, 2016). According to Hamzah (2010), regardless of the learning style or condition chosen, differences in learning styles show the fastest and best way for each individual or student to be able to remember information from outside.

Tools, teaching materials, and media are needed to help the implementation of the learning process in the classroom, which must be prepared by teachers before learning begins. In this study, we focused on the learning media. Learning media is an intermediary that is used as a tool in the teaching and learning process so that learning becomes more effective and efficient. Learning media can also increase attention, provide students with a similar experience regarding an event, and clarify the information provided by teachers to avoid misconceptions, so that the learning process is more interactive and able to increase students' ability to learn (Susanti, 2019). Learning media used by teachers can be developed using technological newness (Fatimah and Bramastia 2021).

Indonesia is one of the countries rich in natural resources, for example, Indonesia has many types of plants with different characteristics (Suryani, Amir, Nurfathurrahmah, Azmin, & Hartati, 2021). Each of these plants needs to be identified to determine their benefits and uses in humans. However, there are still many obstacles faced by students in identifying plant types, such as the lack of learning resources, learning media, and

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low ability of students to identify plants. This causes learning to be less effective (Septaria & Fatharani, 2022). Students are also only presented with pictures and explanations of plants in the book which are still limited, even though in the environment around us there are many types of plants that are not all presented in the reading book (Pujianto, Degeng, & Sugito, 2020). In addition, the scientific name of a plant is one of the things that is basically very interesting to learn. But in general, students who are studying scientific names and plants have difficulty in learning these scientific names because all use Latin (Wijaya, Sahputra, & Kornengsih, 2020).

Observation results (Liunokas & Billik, 2021) show that students have difficulty recognizing the various types of plants found in their learning environment. Students only know a few types of plants that are commonly used but do not know carefully and deeply about other plants. This is one of the factors that cause student learning outcomes to be able to identify low plants. The results (Zarisma, Qurbaniah, & Muldayanti, 2016) also show that students' learning difficulties in the indicator of compiling the classification of divisions in the plant world are 62.63% with high criteria.

Based on the above problems, it is necessary to innovate learning media that use technology to help students easily identify plants. In this case, the author will research innovation in identification of learning media using *plantamor-assisted plantnet* applications. Through the use of this media, students will find it easier to identify plants found around them because this application will provide answers to plant identification easily and easily.

Educational innovation is a process that always occurs because of several external factors and factors within human beings. Interaction between external and internal factors can lead to the development of science and technology. Education must also be ready to respond to all the changes that occur, so innovation in the world of education is necessary (Link & Olya, 2017).

Application *plantNet* can identify plant species online through images, both from mobile phone galleries and photos taken directly. The app can identify plant parts, such as leaves, flowers, fruits, bark, and their classification (Joly et al., 2016). Students can also use the website *plantamor*, where the technology is directly connected to external links such as Google and USDA (*United States Department of Agriculture*) or the United States Department of Agriculture so that plant identification is carried out using *plantNet* can be validated by using this website. According to Guo and Gao (2018), the application of plant species identification with features of one type of organ can invalidate the identification data because the information provided by a single organ is always limited.

The results of the research conducted by (Septaria & Fatharani, 2022) indicate that the use of the app *plantNet* can significantly improve students' conceptual and procedural abilities and help in analyzing and understanding the concepts discussed. Students can gain their own knowledge because of the use of the *plantNet* app, and *the plantamor* can be used anywhere and anytime. The use of these two applications is expected to achieve Basic Competencies, according to the demands of the 2013 curriculum.

## 2. Method

The method used in this study was a literature study research method. Literature study is research by using various references such as articles from previous research, books, or other sources to obtain data or information (Putri, Kurnia, Rukmana, Nursanti, & Saepudin, 2022). The literature study design used was narrative review. Narrative review is a type of research that aims to identify and analyze previously researched scientific articles or journals and look for novelty from these various references (Ferrari, 2015).

The object of research studied in this study is a plant identification learning medium using the *plantNet* application or the *plantamor* website on plant material. The subject of this study is several studies that have investigated the use of *plantNet* and *Plantamor* learning media. The data collection and literature sources used in this study were obtained from the Google Scholar database. The research procedure was carried out by determining the topic to be studied and then collecting various references, such as scientific articles, books, and other sources regarding learning media, *plantnet* applications, and *plantamor* websites. The researcher then selects literature that is relevant to the research objectives and analyzes all the review literature and process data that support the latest innovations or ideas carried out by the author on the identification learning media.

## 3. Results and Discussion

### 3.1 Innovation of Plant Identification Learning Media Using *Plantamor-Assisted PlantNet* on *Plantae* Materials

The objectives of plant identification media innovation using *PlantNet* Application assisted by *Plantamor*:

1. It is easier for students to identify any plant species found in the field or around the school using *the PlantNet* Application, and the identification results will be validated using *the Plantamor* application so that students will not find it difficult to learn plant identification.
2. Validly identify and describe plants found in the field or around schools.

3. Maximize and save time when learning about plant identification.
4. The Kingdom plantae (plant) learning at school has become more interesting and enjoyable.

### 3.1.1 PlanNet App

Application *plantNet* is an application that can identify a type of plant through photos, either taken directly or stored in the mobile phone gallery. Parts of the plant organs that can be identified using an app *plantNet* are leaves, flowers, fruits, and bark. However, the leaf (Septaria & Fatharani, 2022) is the part most commonly used for plant identification. According to a study by Joly et al. (2016), Application *plantNet*, which was developed in March 2013 on iOS, can launch 22,574 images consisting of 957 plant species. In less than a year, the plant data in the app increased to 66,000 images of 3,600 species. In 2014, *PlantNet* Android was officially distributed a year after the iOS version. In the Android version, there is more data development, which includes 85,750 images of plants consisting of 3,957 species and several innovations in the software. The *PlantNet* application has several main functions: (1) an image reader for identification, (2) a taxonomic search including common names with a complete search function, and (3) an image-based identification tool in the form of a visual search engine focusing on four simple types of displays (flowers, fruits, leaves, and bark).

The advantages of the app *PlantNet* are that it has an attractive appearance and a complete plant identification system because there are many plant lists available, it is easy to use, and this application is free and can be accessed for free on the Play Store and App Store. By using the App *PlantNet* in learning, students can obtain a lot of new information because this application has complete features, including various plants from various countries, so that students can easily identify the types of plants. In addition, the use of this application is also quite practical and takes a very short time, which is approximately 4 to 20 s to identify one plant. Therefore, the App *PlantNet* makes it easier for students to determine the classification of a plant and speeds up the identification process, so that the application *PlantNet* can be used anywhere and anytime to aid in plant identification. In addition to having advantages, the application *PlantNet* It also has a drawback, namely that this application requires a fairly good camera so that the fruits can be clearly identified and this application cannot distinguish plants that have similarities so that sometimes the identification results are not appropriate so they are invalid (Rifa, K, & Hasanah, 2020). Therefore, the help of other applications is urgently needed to validate the identification results found in the *PlantNet* application, including the website *Plantamor*.

#### 3.1.1.1 PlantNet Usage Procedure

The procedure for using the *PlantNet* application is as follows:

1. Students download the "*PlantNet*" application on the *play store* or *app store* of their respective cellphones (Figure 1)

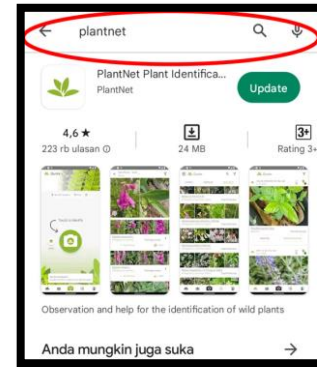


Figure 1. View of the "*PlantNet*" App on the *Play Store* or *App Store*

2. Students open the downloaded "*PlantNet*" application and a display will appear as shown in figure 2, then select the "*profile*" option to register for membership in *PlantNet*.

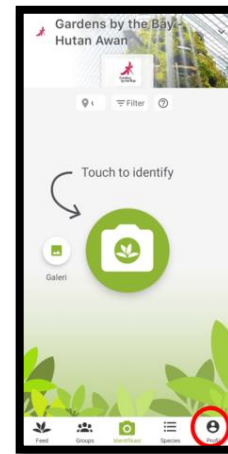


Figure 2. *PlantNet* App Home Page

3. Students "*sign up*" using email or *Google accounts*. If you already have an *account*, you can immediately "*log in*" in the *PlantNet* application (Figure 3).

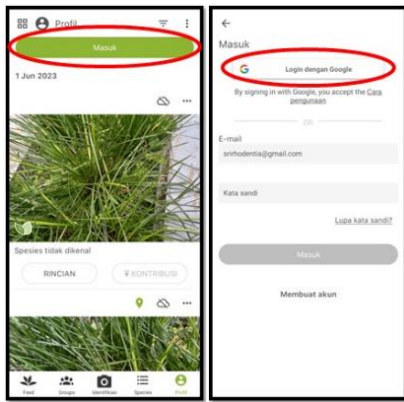
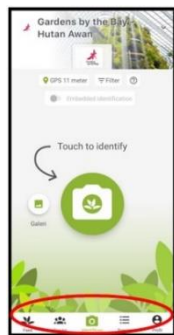


Figure 3. Students Sign Up

4. After successfully logging in, the "Touch to identify" display will appear to identify the surrounding plants using the camera (live photo) or images in the gallery (Figure 4).



2. Species, Identification, and Profile Features  
 These "species" feature functions to display all types of plants in the PlantNet application based on family, genus, and species. Meanwhile, the "Identification" feature serves to identify scientific names or plant species found in the field using the PlantNet application. The "Profile" feature functions to show a summary of all types of plants that we have identified using the PlantNet application (Figure 6).

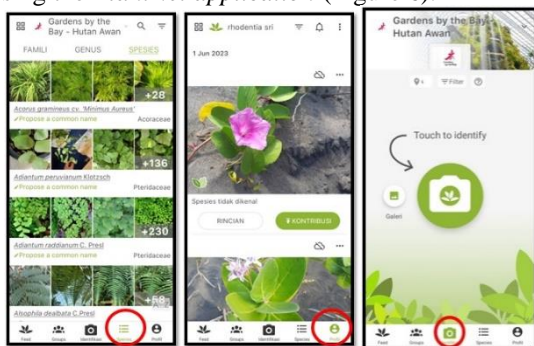


Figure 6. Species Identification, and Profile Feature Pages

### 3.1.2 Plantamor App

Plantamor is a website that provides detailed information about the classification of various types of

Figure 4. Pages to identify plants

### 3.1.1.2 The features available in the PlantNet application can be described as follows.

The features available in the PlantNet application are as follows:

1. Feed and Group Features

This "Feed" feature displays all types of plants in the PlantNet application. Meanwhile, the "Group" feature displays all plant groups that have been grouped based on certain characteristics in the PlantNet application (Figure 5).

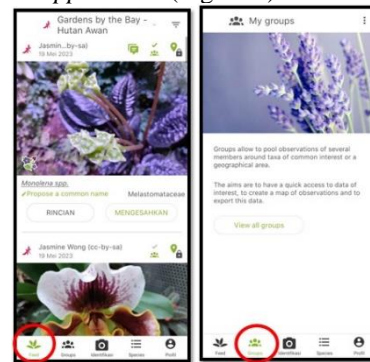
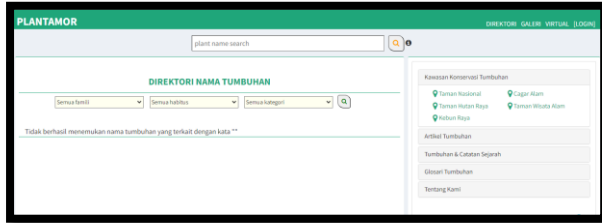


Figure 5. "Feed" Feature Page and "Group" Feature

plants and can be accessed by anyone for free. By using the Planetamor website, students can easily find the type of plant that will be sought for classification because this website provides alternative searches, such as local names. In addition, on the Plantamor website, pictures of plants will be searched for classification, types of flowers, stems, leaves, and fruits. This will greatly help teachers and students identify plant classifications (Arjaya & Javandira, 2018).

The advantage of the Plantamor website is that it provides sharing information about plants, ranging from their scientific names, common names, relatives, to their appearance through online maps. The Plantamor website also provides a means to virtually observe the appearance of various types of plants in the real location where they grow. In addition, information regarding plant names was collected from various sources. The scientific name and taxa mostly refer to the plant site belonging to the USDA (US Department of Agriculture (USDA)). Another source that is most often cited is the book "Tropica; Color Cyclopedia of Exotic Plants and Trees" by Alferd Byrd Graf. Common names in various languages in Southeast Asia are mostly taken from books published by the Plant Resources of South-East Asia). In addition to having advantages, Plantamor also has disadvantages, namely its less structured appearance makes users spend more time

exploring each feature provided. This may make it quite difficult for students to use *Plantamor*, especially for first-time use (Mus 2023). The procedure for using *Plantamor* is that students open the "Plantamor" website on Google, and then a display appears, as shown in Figure 7.



**Figure 7.** Plantamor Home

### 3.1.3 Materi Plantae

**Table 2.** Basic Competencies (KD) and Competency Achievement Indicators (GPA) of Plantae Materials

Basic competencies	Competency Achievement Indicators
3.8. Grouping plants into divisions based on general characteristics, as well as relating their role in life	3.8.1 Manifest the characteristics of the body, way of life, habitat, reproduction of mosses, ferns, and seed plants in the surrounding environment 3.8.2 Compare the general characteristics of divisions within the kingdom plantae (plants) through observation 3.8.3 Classifying various types of plants in the surrounding environment based on observations of their characteristics 3.8.4 Analyze the role of various plants that in the surrounding environment based on experience and literature studies.
4.8 Present reports on the results of phenetic and phylogenetic observations and analyses of plants and their roles in life	4.8.1 Present a written report on the results of phenetic and phylogenetic observations and analyses of various types of plants in the surrounding environment and their respective roles

### 3.2 Implementation of *Plantamor-Assisted PlantNet Technology* as a Plant Identification Medium

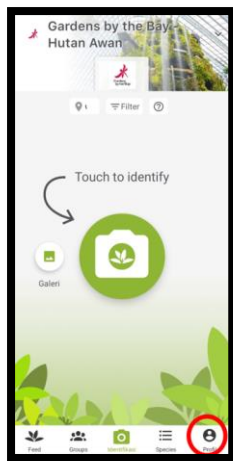
Steps Learning kingdom plantae (Plant) using the *PlantNet-Assisted Plantamor*, which are as follows.

**Table 2.** Learning Steps

It	Learning Steps
1	Students are taken around the school to observe and identify plants.
2	Students use <i>the PlantNet</i> application to determine the scientific name (species) of the plant found.
3	Students observe the morphological characteristics of the plants found including leaves, stems, roots, flowers, and fruits as well as the role of the plant.
4	Students validate the plants found using the <i>Plantamor</i> website, where the website can be directly connected to Google and USDA so that the identified plants are more valid.
5	Once valid, students look at the scientific classification on <i>the Plantamor</i> website and classify the plants by division. Students can also find additional information, such as a description of the plant's morphology in the <i>Plantamor app</i> .
6	The identification results of each plant are made in the <i>Canva</i> application, then uploaded to <i>google drive</i> for assessment by teachers.

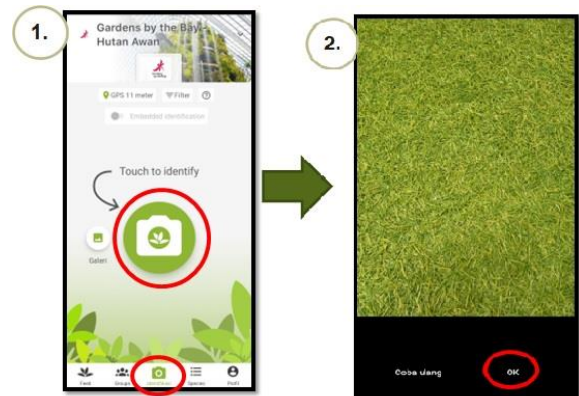
Implementation of plant identification media using *PlantNet Application* assisted by Plantamor:

1. The teacher provided the LKPD for plant identification, including species and plant morphological characteristics, such as leaves, stems, roots, flowers, and fruits, as well as the role of the plant. Small groups (to 3-4 students) were then formed.
2. The teacher asks students to download the *PlantNet application* on the play store or mobile app store, and a display will appear as shown in Figure 3.8, then select the "profile" option to register for membership on *PlantNet* (Figure 8).



**Figure 8.** PlantNet Application Home Page on *Mobile*

3. Teachers bring students to the school environment to identify plants in the school environment by bringing cellphones, LKPD, and stationery to each group.
4. Students determine the scientific name (species) of the plant found in the school environment by opening the *PlantNet application*, then select the "identification" menu on the *PlantNet* application and click the "camera" image to take a photo of the plant to be identified and then click "ok" (Figure 9).



**Figure 9.** Identification page to identify plants directly  
 5. Then, click on the leaf because it is the most valid part used to identify plants using the *PlantNet application* (Figure 10).



**Figure 10.** Pages To Select Plant Organs Used In Identifying

6. If students have difficulties with the Internet network when identifying plants directly, because the *PlantNet* application requires a stable Internet network, then students can take photos of plants found in the school environment using a cellphone camera so that the image is stored in the cellphone gallery.
7. To identify plants from images or photos that already exist on your cellphone, select the "identification" menu in the *PlantNet application*, and then click "gallery." Then, select "photos" from the gallery and click "ok." Then click on "leaf" because the leaf part is the most valid part used to identify plants by using the *PlantNet* application (Figure 11).



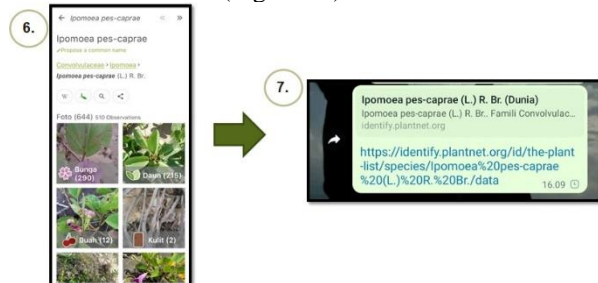
**Figure 11.** Pages to identify plants using photos from the cellphone gallery

8. If the plant name is not immediately identified, select "identify in World" and the plant name or species will appear in its image (Figure 3.12).



**Figure 12.** Identified Plant Species Display Page

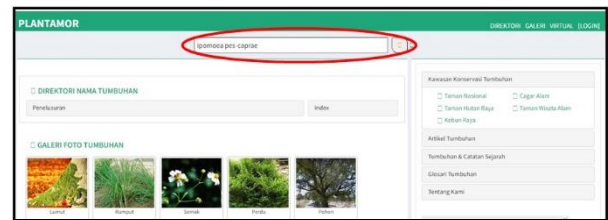
9. The identification results in the *PlantNet* application can be sent to WhatsApp or other applications in the form of a "link" (Figure 13).



**Figure 13.** Plant Identification Result Link Display Page

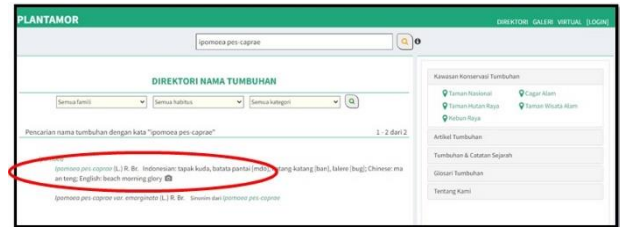
10. Students observed the morphological characteristics of the plants, including leaves, stems, roots, flowers, and fruits, and looked for the role of these plants.

11. After students found the scientific name or plant species identified using the *PlantNet* application, they validated the results of plant identification found using the *Plantamor* website by opening the *Plantamor* website on Google (<http://plantamor.com/species/search>), then typed the scientific name of the plant that had been found in the *PlantNet* application. Example: *Ipomoea pes-caprae*, then press "enter" (Figure 14).



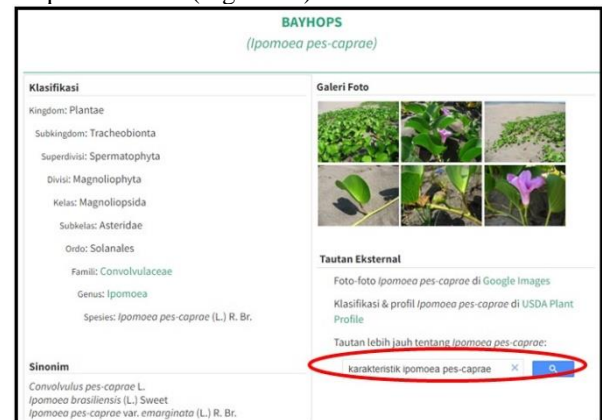
**Figure 14.** Search view page in *Plantamor* to validate plant identification results

12. Then, a display-like image 15 appears and selects the name of the plant for which we want to find the classification.



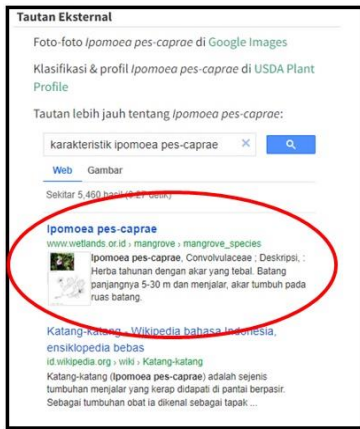
**Figure 15.** Plant Name Search Results Display Page

13. A display of information about the plant we want to validate the identification will appear, then type the things we want to know about the plant being identified, for example, the characteristics of *Ipomoea pes-caprae* in the "search" section and press "enter" (Figure 16).



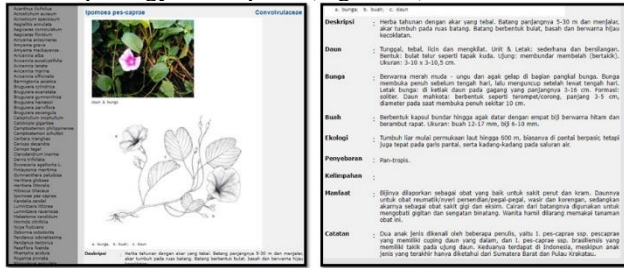
**Figure 16.** Plant Information Classification and Search Display Page

14. Select the section or description we want to know about the plant we are identifying with (Figure 17).



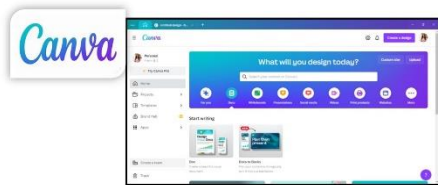
**Figure 17.** Plant Information Classification and Search Display Page

15. Then, various pieces of information will appear, such as a description of the morphology of the plant (Figure 18).

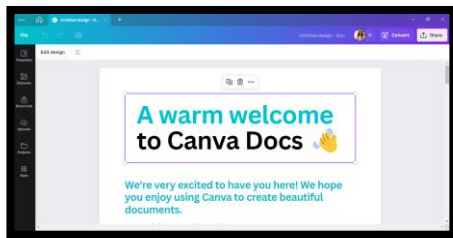


**Figure 18.** Morphological description display page of identified plants

16. The identification of each plant is created in the Canva app, then  
 17. uploaded to Google Drive for teachers to grade (Figure 19).



**Figure 19.** Canva App homepage



**Figure 20.** An example of a Canva Docs display that can be edited by students to create classifications, images, and plant characteristics that have been successfully identified in the field.

#### 4. Conclusion

Plant identification media using the *PlantNet* application assisted by *Plantamor* can be used as an innovative learning medium in the classroom on kingdom plantae (plants) material. The *PlantNet* application can identify a type of plant through photos, either taken directly or photos stored in the gallery. A *plantamor* is a website that provides detailed classification information on various types of plants and can be accessed freely by anyone. Information that can be accessed in the *plantamor* application, such as classification, description, leaves, flowers, fruits, ecology, distribution, benefits, and other information about the plant being identified. Therefore, combining the *PlantNet* application as a tool to identify plant species through images with the *Plantamor* website as a tool to validate the identification of plants found because it provides information about the plants that are being identified will greatly help students in learning and make it easier for teachers to teach and create fun learning for students and teachers.

#### References

- Arjaya, I. B. A., Javandira, C. (2018). IBM SMP Negeri 4 Denpasar. *Bakti Saraswati*, 7(1), 68–76. Retrieved from <https://ejournal.unmas.ac.id/index.php/baktisaraswati/article/view/153>
- Ayuni, N. P. B., Zunaena, M., Oktaviani, R. D., Kristinah, N., & Yuliyati, S. (2018). Biology education students' knowledge of biology laboratory equipment. *Biology Education* 1(1): 1–7. Retrieved from <https://jom.untidar.ac.id/index.php/nectar/article/viewFile/979/538>
- Fatimah, H. & Bramastia, B. (2021). Literature Review of the Development of Science Learning Media. *INQUIRY: Journal of Science Education*, 10(2), 125. <https://doi.org/10.20961/inkuiri.v10i2.57255>
- Ferrari, R. (2015). Writing narrative style literature reviews. *Medical Writing*, 24(4), 230–235. <https://doi.org/10.1179/2047480615z.000000000329>
- Guo, P., & Gao, Q. (2018). Multi-organ plant identification method using convolutional neural networks. *Proceedings of the IEEE International Conference on Software Engineering and Service Sciences, ICSESS, 2017-Novem*, 371–376. <https://doi.org/10.1109/ICSESS.2017.8342935>
- Hadija, Kapile C. and Juraid. (2018). Application of the discussion method to improve learning outcomes of grade IV in social studies subjects at SDN No. 2 Tamarenja, Sindeu Tobata District. *Tadulako Online Creative Journal* 4(8): 11–30.
- Hamzah, D. U. (2010). A new orientation in the

- psychology of students with a learning style. Jakarta: Bumi Aksara.
- Indy, R. (2019). The Role of Education in the Process of Social Change in Tumuluntung Village, Kauditan District, North Minahasa Regency. *HOLISTIC, Journal of Social and Culture*, 12(4), 1–18. Retrieved from <https://ejournal.unsrat.ac.id/index.php/holistik/article/view/25466>
- Joly, A., Bonnet, P., Goëau, H., Barbe, J., Selmi, S., Champ, J., ... Barthélémy, D. (2016). A look inside the Pl@ntNet experience: The good, bias, and hope. *Multimedia Systems*, 22(6), 751–766. <https://doi.org/10.1007/s00530-015-0462-9>
- Kadi, T., & Awwaliyah, R. (2017). Educational Innovation: Efforts to Solve Educational Problems in Indonesia. *Journal of Islamic Nusantara*, 1(2), 144–155. <https://doi.org/10.33852/jurnal.in.v1i2.32>
- Lahra, A. S., Hasan, M., & Mursal, D. (2017). The development of practicum modules is based on an open-ended approach to increasing student creativity. *Indonesian Journal of Science Education* 05(01): 36–43. Retrieved from <http://jurnal.unsyiah.ac.id/jpsi>
- Liunokas, A. B., Billik, A.H. S. (2021). Development of textbooks on plant morphological characteristics to improve students' ability to identify plant types. *Journal of Basicedu*, 5(6), 5885–5891. <https://doi.org/10.31004/basicedu.v5i6.1596>
- Mus, C. (2023). About Plantamor. Retrieved from <http://plantamor.com/> (June 2, 2023).
- Pujianto, A. A., Degeng I. S., & Sugito, S. (2020). Effect of the use of plantnet applications and learning styles on learning outcomes. *Journal of Educational Technology Innovation*, 7(1), 12–22. <https://doi.org/10.21831/jitp.v7i1.31365>
- Putri, Kurnia, S., Rukmana, Nursanti, E., & Saepudin, E. (2022). Universitas Airlangga Library Journal: Information and Communication Media Librarian: A Narrative Literature Review Of Digital Library Research As A Source Of Learning During Covid-19 In The Google Scholar Database Narrative Literature Review Digital. *Urnal Library Universitas Airlangga: Information and Communication Media of Librarianship*, 12(2), 90–101.
- Rifa, M. R., K, R. A., & Hasanah, R. (2020). Plantnet Science in the Classification of Living Things. *Journal of Science Education*, 1(2), 29–37.
- Septaria, K., and Fatharani, A. (2022). Analysis of PlantNet Software Usage on Acquisition, 05(01), 73–83.
- Suryani, E., Amir, A., Nurfathurrahmah, N., Azmin, N., & Hartati, H. (2021). Identification of Learning Difficulties for Grade VIII Students of the SMPN 3 Bima City Material on the Diversity of Living Creatures for the 2020/2021 Academic Year. *Journal of Natural Sciences Education (JP-IPA)*, 2(01), 23–27. <https://doi.org/10.56842/jp-ipa.v2i01.57>
- Susanti, R. (2019). Learning and Learning. Palembang: Symmetrical.
- Wijaya, A., Sahputra, E., & Kornengsih, R. (2020). Implementation of the Resource Assignment Algorithm in Latin Flora and Fauna Applications for Android-based Learners. *Journal of Media Infotama*, 16(1), 9–15. <https://doi.org/10.37676/jmi.v16i1.1123>
- Yuliandari, S. and Wahjudi, E. (2016). Development of interactive media-based learning media in economics subjects, journal materials, adjustment of service companies. *Journal of Service Company Adjustment*, 1(1), 1–9.
- Zarisma, U., Qurbaniah, M., & Muldayanti, N. D. (2016). Identification of students' learning difficulties in plant world material class X state high School 1. *Journal of Bioeducation*, 3(2). <https://doi.org/10.29406/184>