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Identification of Ornamental Plants Via Google Lens Based on Intersemiotic

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Abstract: This research aims to develop a feasibility test and practical application of biology learning media technology, especially in terms of taxonomy introduction via google lens. The experimental method was used to collect identification data regarding intersemiotic translation of ornamental plants. The stage to find out the quality of intersemiotic translation of the research object using a google lens in the form of the general method of photo analysis in the use of google lens using the keys of google lens results evaluation method by Shapovalov et al. (2020). The research object which was taken randomly via google lens will be analyzed for information regarding three to six detected results to examine information about the object based on genus and species. The result is google lens can identify ornamental plants well. Intersemiotic translation results have been obtained in the seven plants as research objects. Five research objects have a score of 3 and two research objects get a score of 2 based on the keys of google lens results evaluation. The identification of ornamental plants from the photo is Aglaonema plant, Tillandsia Usneoides, Sansevieria Trifasciata, Aechmea chantinii, Neoregelia fireball, Neoregelia marmorata, and Calathea Makoyana.

Keywords: Intersemiotic**;** Google Lens; Ornamental Plant; Taxonomy

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Introduction

The ornamental plant market is undergoing a global transformation (Ferrante et al., 2015). Ornamental plants are plants that are cultivated or planted because they have aesthetic value in flowers, leaves, and the whole of the plant (Majanah & Saputri, 2019). The function of ornamental plants is in the form of decoration and beautifying the environment where they are inside or outside the room. Ornamental plants have 2,000 genera which include floriculture plants, ornamental shrubs, trees, grasses, bamboo and aquatic plants (Chen, 2021). Typical things related to ornamental plant breeding include increasing varietal traits, new colors, shape, size, number of flowers, flower vase age, repeated flowering, disease resistance, nutrient uptake capacity and growth habits (De, 2017). The highest consideration for ornamental plant consumers is the neat physical appearance of plants as ornaments. In addition, the ultimate size of the plant is also very important, then followed by the criteria for the color, shape, and aroma of the plant. The final calculation of the selection considerations is the size of ornamental plants (Middleton, 2015). A qualified identification ability is needed by ornamental plant lovers during the Covid-19 period to have knowledge about the characteristics, types, classes and clumps of plants with good prices and quality or not. Then, further identification of ornamental plants can also be directed at the efficiency of medicine which is very beneficial for

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humans. The benefits of plant identification both physically and horticulturally, the selection and determination of ornamental plants will be more precise and in accordance with the desired character (Febriarta et al., 2012; Arai et al., 2013).

Species identification is a skill that a botanist must possess. Human skills in identifying plants, especially in biodiversity research and conservation are starting to be replaced by artificial intelligence (Jones, 2020). Identification of ornamental plants as knowledge references for the wider community can be done by utilizing information technology that comes from the world's largest data search platform called Google with technology known as Google Lens in the form of utilizing photos of ornamental plants that are targeted for later review of relevant information digitally. The use of google lens on ornamental plants is as follows: google lens is an augmented reality photo filter that can be run using a smartphone camera where the photos taken will be searched for access to relevant information so that users not only see the results of the the results of the photo but understand the photo information that is produced online as well (Devi & Gaurav, 2018).

The advantages of Google Lens are the recognition of information, text, links, accurate barcodes, fast analysis, and an incredibly large database. Google lens with augmented reality helps to increase students' learning motivation in combining the real world with the virtual (Shapovalov et al., 2019). The level of Bloom's taxonomy analysis on student learning outcomes is increasing with the use of augmented reality technology in biology learning (Weng et al., 2019). Hardware that supports virtual reality (VR) and augmented reality (AR) can be applied to biology education including in lab courses. In terms of science education, the preferred category in augmented reality technology is image-based AR. Marker and markerless technologies in image-based AR are useful for enhancing practical abilities, spatial skills, and understanding of concepts through real-time interactive simulation experiments (Zhou et al., 2020). In the process of classifying flower photos by google lens to identify image content, it is built on low-level features such as texture and color. Color features are depicted through normalization of the color histogram while texture features are depicted through a gray level co-occurrence matrix (Anushya, 2019).

The development of a multilingual interface on google lens makes it easier for students to use it (Shapovalov et al., 2018). Identification via google lens of information that is used as a reference to the public can be analyzed by searching for relevant contexts by running programs digitally on screenshots of target ornamental plants. The study is in the form of intersemiotic translation of the captured photos of ornamental plants to provide data in the form of definitions of ornamental plants under study. That is the benefit of the link between translation and plants in biology education. Thus, identification of ornamental plants via google lens in the digital era with reference to intersemiotic translation is very helpful to meet the guidelines for the community (Dutt et al., 2015; Bilyk et al., 2020).

Morin's explains that there is a term biosemiotics, namely a discussion that links semiotics to explain biological characters in general as a system of knowledge and a system of signs, symbols and messages that discuss plants (Guevara & Zorrilla, 2014). Intersemiotic translation or transmutation is an interpretation of verbal signs derived from the meaning of non-verbal sign interpretation systems. Such as: signs, symbols, icons, pictures, and paintings (Hassanabadi & Heidari, 2014; Kotela, 2016).

While, Ziganshina (2017) states intersemiotic translation is a broad view of the process of transferring meaning from one sign system to another sign system or from one medium to another. In Royce (2015), the discussion of visual language is influenced by the visual design system which is a variety of systems for displaying representational symbology that functions to combine the embodiment of visual messages or syntagms. In other words, visual elements are organized into structures that can be interpreted or recognized. Because of this discussion, intersemiotic translation plays an important role in the identification of ornamental plants and this study examines intersemiotic translation to define the object of research via google lens.

Method

This research was conducted in the Pango Raya area, Ulee Kareng District, Banda Aceh City, Aceh Province, Indonesia. Along this road is famous for selling ornamental plants that are complete, varied and in large numbers. The research was carried out experimentally by testing the use of google lenses at 4 well-known flower sales locations in Pango Raya named Violet Garden, Mini Garden, Mawar Garden and LA Garden. The flower samples that were used as research objects were randomly selected as many as seven objects and taken to the city of Langsa where Samudra University is located for identification Support.

This study uses a trial and error method (Starch, 1910; Rasmussen, 1982; Baigrie, 1989; Beer, 1995; Brown et al., 2018) with a descriptive approach (Loeb et al., 2017). This study aims to develop a feasibility test and practical application of biology learning media technology, especially in terms of taxonomy introduction via google lens (Shapovalov et al., 2020). The experimental method was used to collect identification data regarding intersemiotic translation of

ornamental plants which was booming in the digital era during the Covid-19 pandemic where growing ornamental plants became a hobby during isolation which had an impact on mental health (Reis et al., 2020; Ribeiro et al., 2021). The samples in this study were ornamental plants that were booming during the Covid-19 pandemic, which were randomly selected at the research location. The data were analyzed based on the use of google lens in the field of biology education in the form of awareness in terms of characterization of plant objects in this study. The stage to find out the quality of intersemiotic translation of the research object using a google lens in the form of the general method of photo analysis in the use of google lens using the keys of google lens results evaluation method by Shapovalov et al. (2020). The development of biology learning media aims to improve the quality of learning. Biology requires educational media to provide effective and non-verbalized learning such as collaboration between facts, data, images, graphics and photos (Oktaviani et al**.,** 2019).

Tabel 1. The keys of google lens results evaluation by Shapovalov et al. (2020)

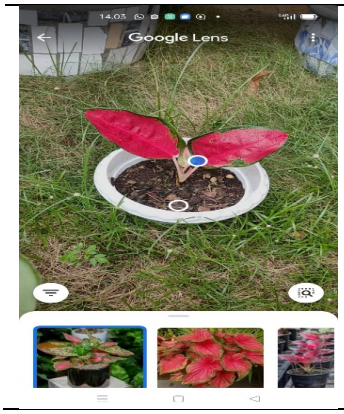
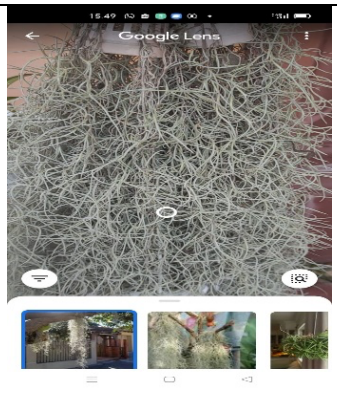
Points	Description
0	The object wasn't detected at all
1	A genus of the object was recognized and presented in top 6 results but species wasn't correctly recognized
2	a) a genus of the object was recognized and presented in top 3 results but species wasn't correctly recognized b) Genus and species of the object was recognized and presented in top 6 results
3	Genus and species of the object was recognized and presented in top 3 results

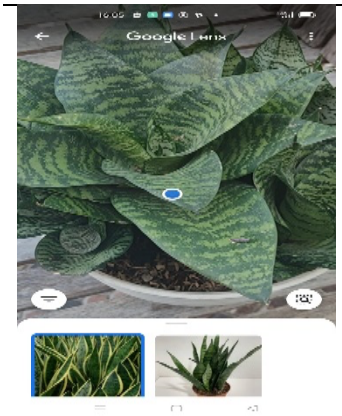
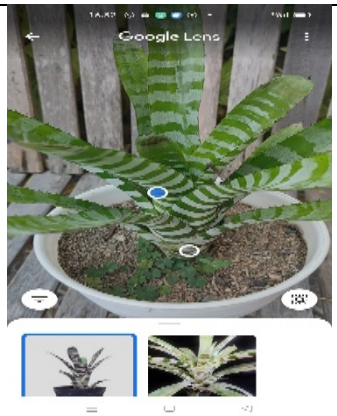
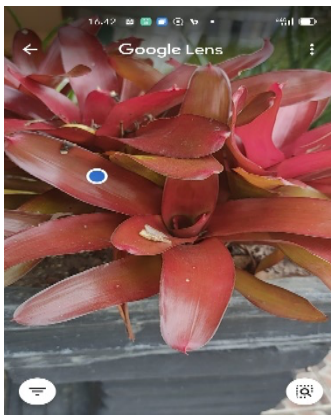
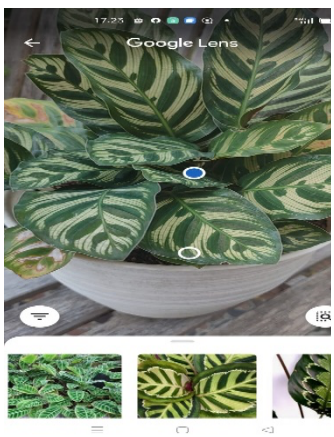
The degree of accuracy is guided y the points obtained during intralingual analysis. If the identification results get points 3 then the accuracy is perfect, point 2 means the accuracy is accurate and point 1 means the accuracy is inaccurate.

Result and Discussion

The research object which was taken randomly via google lens will be analyzed for information regarding three to six detected results to examine information about the object based on genus and species as well as further information that meets the description of the identified object criteria.

Table 2. Identification of intersemiotic

Photograph via google lens	Criteria	Points	Photograph via google lens	Criteria	Points
	A genus of the object was recognized and presented in top 3 results but species wasn't correctly recognized	2		Genus and species of the object was recognized and presented in top 3 results (Note: In the second to third identification experiments)	3

Photograph via google lens	Criteria	Points	Photograph via google lens	Criteria	Points
	Genus and species of the object was recognized and presented in top 3 results	3		Genus and species of the object was recognized and presented in top 3 results	3
	A genus of the object was recognized and presented in top 3 results but species wasn't correctly recognized	2		Genus and species of the object was recognized and presented in top 3 results	3
	Genus and species of the object was recognized and presented in top 3 results	3			

Google Lens has detection access into google photos and google camera which can be used on any Android 4.4 or higher or iOS device. The use of google lens in biology education can be used to recognize the character traits of biological objects such as plants (Shapovalov et al., 2020). The use of digital cameras via google lens as an activity to identify natural objects provides a "protective space" to feel more comfortable and safer from unfamiliar plants (Chambers, 2018). The results on the seven photographs obtained criteria for perfect scores with a score of 3 points for 5 object identifications and accurate values with a score of 2 for 2 objects. Object photograph numbers 2, 3, 4, 6, and 7 have the highest scores because the criteria are genus and species of the object was recognized and presented in top 3 results. Object photograph numbers 1 and 5 have a score of 2 because the criteria are a genus of the object was recognized and presented in top 3 results but the species wasn't correctly recognized.

Photograph on number one is identified accurately because up to the sixth result which provides information regarding the genus aglaonema in general without being able to get more specific detection such as species data according to the object of research in reality which was photographed via google lens. Aglaonema is a genus of plants belonging to the family Araceae which

is found in tropical and subtropical areas of the Asian continent (Rodriguez-Sanchez, 2015). Aglaonema is an ornamental plant in the form of foliage that has a strong appeal due to the variety of leaves that are tolerant to drought and low light conditions (Fan et al., 2013). According to Nicolson (1969) explained that in general aglaonema species are erect, with relatively unbranched stems and generally with internodes. Growth continues with the lower leaves falling off, leaving the plant with tufted leaves at the top of the stem covered below by circular leaf scars. All species are herbaceous and the generic name of aglaonema means "shining stamen" in Greek.

Aglaonema plants are ornamental plants without flowers but have a variety of leaves which include motifs, shapes, colors and sizes which make this plant traded by counting the number of leaves, leaf color, motifs and promising in terms of business due to high prices. In intralingual translation of photograph identification via google lens through the top three results, it has been identified that the image can be translated as 'aglaonema suksom' for Indonesians with characteristics such as the dominant bright red leaf color on the leaves and only a few shiny green edges. Later, it was informed that it has less chlorophyll than other species. The selling price ranges up to half a million rupiah in the province of Aceh (Apriansi & Suryani, 2019).

Photograph on number 2 via google lens identifies the object accurately which is perfect with a score of 3 during the second and third experiments because in the first experiment there was an error. At the time of the first experiment, google lens recognized the object as the genus of usnea. Meanwhile, the previous intersemiotic identification of the google lens photo of this ornamental plant was carried out by members of the biology laboratory at the University of Samudra which resulted that the plant was Tillandsia Usneoides. The error occurred because of the similarity of the picture between the genus from usnea and the genus from tillandsia in the digital photograph recognition. Initially, during the first experiment, the identified information was in the form of the genus has been classified as usnea but it is still not specific because there is a lot of information on different species such as Usnea filipendula, Usnea barbata, Usnea rubicunda, Usnea scabrata, Usnea lambii and even Usnea baileyi. After an error was found, further identification was carried out two more times where the identification was accurate because two of the three trials were the same, so it was concluded that the level of accuracy was a score of 3. The correct identification on photos by google lens is tillandsia usneoides. As revealed by Suriel (2010) that the ornamental plants absorb nutrients and moisture from the air. It is also a microhabitat that is a shelter for various organisms including one species of jumping spider, various species of bats and also rat snakes. In Schreck et al. (2019) and Sun et al. (2021) stated that the ornamental plant has an effective function as a bioindicator of metallic contamination and an indicator of atmospheric contamination. In, Rini et al. (2008) and Rindita et al. (2015), atmospheric contamination can occur due to air pollution caused by vehicles which are the main source of producing carbon dioxide, nitrogen oxides and sulfur oxides.

Tillandsia usneoides also known as "long moss", "black moss", or "Spanish moss" is the most widespread representative of the tropical and subtropical Bromeliaceae family. It is widely distributed in America with warm temperatures (Poczai & Hyvonen, 2017). It is completely unrelated to the tree, but simply wraps its dead, bony trunk loosely around the branch to support itself. It is not a parasite. It can live only requires air and rain, some decorations are supported by threads and hung on some branches of trees where moss has grown. The explanation above is in accordance with the information identified from the top three results via google lens so that the intralingual translation of this object has been answered (Billings, 1904).

Photograph number 3 was identified accurately and perfectly because it was immediately recognized by the introduction of its scientific name on a google lens search result as Sansevieria trifasciata where the genus and species were informed. The plant is widely bred as an indoor ornamental plant which is grown in pots in the tropics and subtropics. This ornamental plant is an annual and succulent plant that is always green. It originally came from Tropical West Africa (Li & Yang, 2020).

Sansevieria trifasciata is a therapeutic plant and is widely found in Indonesia. The leaves are round, rough and stiff. Traditionally used for the treatment of various diseases such as earache, colds, diarrhea, coughs, inflammation of the respiratory tract, swelling, lumps, bruises, boils, venomous snake bites, and hair growth. It is also a strong source of white fiber to be processed into fishing line, net line, rope, bowstring and textile materials. With regard to the intralingual translation obtained from the top three information on the identification of the google lens, it resulted that this plant was included in the Asparagaceae family. This plant is lively in Indonesia with the well-known name, namely mother-in-law's tongue and is also synonymous with Dracaena trifasciata in taxonomy. It also has other names including viper's bowstring hemp, snake plant, or Saint George's sword. The majority of the shades are variegated foliage with silvery yellow or white stripes on the edges of the deep green leaves (Tchegnitegni et al., 2015; Ighodaro et al., 2017; Okunlola et al., 2018; Abdullah et al., 2020; Dewitasari et al., 2021).

Identification for photograph number 4 gets a score of 3 with a perfect explanation because the genus and

species have been described in the top three searches via google lens as Aechmea chantinii. It has brightly colored leaves contrasting with intense opaque bands and brown spines. The genus Aechmea based on the Greek language can be interpreted as "speared leaf" and a common feature of this ornamental plant is the presence of asymmetric sepals (Sass & Specht, 2010). In the ornamental bromeliad industry, Aechmea has resistance to cold, a combination of colors and various types of flowers compared to other bromeliad species including Neoregelia, Guzmania and Vriesea (Zhang et al., 2012). The high ornamental value of plant can also be caused by the special rosette shape and long flowering period (Croonenborghs et al., 2009). The individual appendages of Aechmea chantinii are embellished with a tongue-like margin. Petal appendages are small paired or single outgrowths from the base of each petal. It has more rounded papillae. The stigma only shows the terminal papillae. It has spherical pollen with a fine exine coating without obvious pits (Vervaeke et al., 2003).

The intralingual translation for object number 5 is accurate and has a score of 2 because in the top three searches only the genus is clearly stated but the species is not specified in the information. Neoregelia fireball is a bromeliad that has dark maroon strappy leaves that form a central rosette. In this cup, can grow a small flower head with a bluish white color. Fireballs branch off easily which can be removed to cultivate new plants. Neoregelia is one of the popular ornamental plants in Indonesia. It belongs to the bromeliad genus where the distinctive arrangement of thick leaves and bowl-shaped like a rose. This plant is also a habitat for mosquito larvae. This ornamental plant has a problem when the weather is hot and exposed to sunlight where the tips of the leaves evaporate too much water to wilt. High survival rates up to 80% but very low aesthetic value due to abnormal symptoms such as dry leaf atrophy (Phonpho et al., 2019; Ikhsan, et al., 2020)

Objects identified number 6 via google lens received a perfect rating with a score of 3 because the genus and species were immediately identified as Neoregelia marmorata on the first search. The intralingual translation of the three searches above is very well identifiable where Neoregelia marmorata is synonymous with the names Aregelia marmorata and also has common names as Baker, Marbled bromeliad and Marbleplant. This species has a beauty with large pale green leaves and on both sides, there are large reddish-brown spots and bright red ends. The identification of this object regarding mosquitoes is the same as object number 5 where the Neoregelia genus is a niche for Aedes aegypti mosquitoes to lay eggs because the shape of a flower is large and breaks down into a water embankment (Chevalier, 1956; Brown et al., 2019).

The translation that can be obtained from the results of the last photographic identification is perfect and a score of 3 corresponds to the genus and species names obtained in the last three results via google lens. This object is Calathea Makoyana (Goeppertia Makoyana) which is also known as Peacock plant, zebra plant, rattlesnack plant orchatedral windows. This species is Calanthea, according to the Greek word 'Calathos' which means basket or container. This ornamental plant is Marantaceae family. This plant has a unique pattern of stripes like a peacock. Calanthea makoyana leaves have lobed with dark green areas extending from the middle vein and their photosynthetic capacity increases steadily when the photosynthetic flux density (PPFD) increases from 0 to 600 mol photons m−2 s−1 and become saturated with further increases in PPFD. (Borchsenius et al., 2012; Pariyanto et al., 2020; Nguyen et al., 2020). Then, Durrington et al. (2020) added that google images can be used for searching specific information about Calathea species.

Conclusion

Google lens can identify ornamental plants well. Intersemiotic translation results have been obtained in the seven plants as research objects. Five research objects have a score of 3 and two research objects get a score of 2 based on the keys of google lens results evaluation. The identification of ornamental plants from the photo is Aglaonema plant, Tillandsia Usneoides, Sansevieria Trifasciata, Aechmea chantinii, Neoregelia fireball, Neoregelia marmorata, and Calathea Makoyana.

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