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Abstract
Biodiversity is one of the critical themes embedded within the national curriculum parallel with the National Biodiversity Policy. In the educational system, the binomial nomenclature is used in classifying the living organisms from all kingdoms, including Plantae. Biological organisms are normally given formal descriptions and official names according to taxonomical identification. Problems arise when students are not familiar with these scientific descriptions and terminologies due to the lack of reading and practice. As these biological organisms exist around us, locals are also exposed and able to identify them. Yet, they used a different terminologies referring to the same species. Hence, the major purpose of this study is to blend scientific descriptions and terminologies derived from local knowledge in teaching and learning to enhance students' understanding. This is a case study on 20 undergraduate students from Diploma of Science who enrolled in Biodiversity-related courses in a local University. These participants were exclusively given lessons which were integrated with the local knowledge. The dependent t-test shows a significant difference in their pre-and post-performance test. Implementing local knowledge in identifying plants species is an ingenious move proven to encourage students' interest in classifying the organisms' species.
Keywords: Local Knowledge, Biodiversity, Plant Identification

Introduction
Biodiversity, and other subjects related to Science have long been warranted a place within the national curriculum, from foundation-level education until tertiary education. Biological organisms are commonly given formal descriptions and official names according to taxonomical identification. Nevertheless, the students remain unfamiliar with scientific terminologies used in identifying samples related to biodiversity, regardless the number of years they spent for formal schooling. Hence, it denies them the ability to recall the terminologies from their scientific

handbooks. Subsequently, they slowly lose interest in class sessions leading to less class involvement and poor understanding of the subject matter. Students also tend to use their own words to imagine and conceptualize real or abstract situations in learning Science. Another future concern is the possibility of more students losing interest in science, which has been linked to traditional, monologic, and transmissive modes of teaching (Lyons, 2006). Biodiversity is the major component of the medicinal and habitat resources. According to the Strategic Plan for Biodiversity 2011-2020; local knowledge is the vital component to be focused on and the implementation of the local knowledge promoted the conservation of biodiversity (CBD, 2010). Local knowledge from farmers and *Orang Asli* (indigenous people) are indispensable. It can be used to enhance the students' knowledge in identifying the biodiversity organisms. Local knowledge is the knowledge held by local groups of people who are well-versed with their local ecosystems. Their instinctual sense of understanding develops as they create their own concepts and words based on their experiences and various experiential processes. The purpose of the study is to implement the terminologies used in daily life by the local people in the classroom lesson so that the students are able to grasp this knowledge. The terminologies will not replace the key identifications in the handbook, but rather an enhancement tool for the undergraduate Diploma students in learning Biodiversity in the classroom.

Problem Statement
The skills in identifying Biodiversity sample is taught as theoretical knowledge and is mostly based on scientific handbooks; allowing students very little room to imagine and visualize biodiversity samples in their authentic settings. Students who are unfamiliar with these terminologies will normally face difficulties in understanding the subject, consequently losing interest in the subject matter.

Objectives
To determine the effectiveness of teaching methodologies which embedded local knowledge on students' academic performance related to plant diversity subjects.

Literature Review
Local knowledge is the knowledge that people in a community have developed over time; it continues to develop based on experiences, which would then be tailored according to the local culture and environment. Local knowledge that is associated with forests, lakes, and rivers along with farming, gardening, and hunting are best represented and obtained by *Orang Asli* (Kardooni et al., 2014). In identifying the sample of plants and insects and their varieties, local names such as blank garden ant, crickets, butterfly, mosses, orchid, and rambutan were commonly used. These directly promote the identification process by using the local description and the morphology. The correct identification of organisms is vital to upsurge the yield of crops. Various types of insects which are commonly found near plants crop, with some being harmless to plants, and the rest inherently harmful such as springtail, flea, carpenter ants, and termites (Joshi et al., 2010). Numerous studies have proven the effectiveness of local knowledge in identifying and classifying the biological samples; an example being the word 'sting' used to analogue the cercus during class instruction to enhance students understanding ("Damselfly - Insect Identification", 2016). In addition, an ethnobiological study in New Jersey has shown that the use of local names

and characteristics during classification of samples would then enhance the comprehension process (Berlin, 1992). Other than that, local ecological knowledge has been proved to be highly accurate in the identification process of plants and animal species distribution in Spain (Soleri et al., 2013). When a comparison between three local communities was done, hunters were those whose identification skills recorded the highest percentage of closely related terminologies (73.5%), followed by middlemen (71.4%), and villagers, which was only 44.6% (Bitanyi et al., 2012). It is suggested that the local terminologies should not replace the key identification in handbooks, and only used to enhance the students' understanding in learning biodiversity in the classroom.

Subjects centered on the topic of Biodiversity have long been embedded within the nation's education system. Recently, the topics gain massive attention from public due to a growing awareness on mass species extinctions through illegal poaching, habitat destructions, and global warming. One of the obstacles which learners may face in properly grasping the concept of Biodiversity is the terminologies used in the handbook for identifying samples which are mostly novel for undergraduate students, making them lose interest in classroom instructions. With these in mind, it is crucial for teaching and learning methodologies to be able to enhance students' understanding. One of the ways is through a dialogical teaching in classroom, whereby teachers can elicit students' everyday language, their own perspectives, and allow them the room to engage with their developing idea. Through this method, it helps the students to overcome misunderstandings about the scientific terminologies in biodiversity. This is important as some terminologies used for certain handbooks may contain errors (Warburton and Martin, 1999). One of the purposes of dialogical teaching in classroom is to collect the terminologies of biological samples that are used by the locals which the students can incorporate in the learning process. Dialogic teaching has been the subject of increasing discussions in the last few years; with a number of writers' emphasis on its great cognitive potential for students, whilst at the same time demanding the most of teachers (Alexander, 2006). Dialogic teaching requires interactions among teachers and students, which encourage students to think in different ways as they have their own perspective and language. This includes question and answer from both parties and exchanging of ideas, rather than passive learning on the students' part. Moreover, the classroom should encourage discussions and dialogues to create a healthy, challenging environment. The teachers will indirectly get feedbacks from the students. According to Alexander (2003), dialogic classrooms allow teachers the room to exploit the potential of five main ways of organizing interaction in order to maximize the prospects for dialogue; whole class teaching, group work (teacher-led), group work (pupil-led), one-to-one (teacher and pupil), one-to-one (pupil pairs). This dialogical teaching can enhance the students' understanding of the content learned and foster their critical thinking skills (Alexander, 2003).

Research Questions
Is there any difference on the students' performance in identifying the plant species using scientific description embedded with local knowledge?

Research Hypothesis
Ho: There is no difference on the students' performance in identifying the plant species using scientific description embedded with local knowledge.

Methodologies
Research Design
The research design is a case study which utilized the quantitative approach. The study was conducted on undergraduate Biology students over a period of four months. In order to obtain the terminologies and description used in species identification, researchers collaborated with Jabatan Kemajuan Orang Asli (JAKOA) Batang Padang and Jabatan Pertanian Daerah Batang Padang, Perak, Malaysia during collection of data. Collection of local description was done at Perkampungan Orang Asli, Kampung Batu 6, Jalan Pahang, Tapah and Jalan Kampung Pasir, Temoh located in Perak. The study was conducted at *Orang Asli* and local farmers' farms. There were four fresh plant samples which were provisionally identified by the *Orang Asli* and farmers. The terminologies and description used by the local peoples were collected via joint discussion. This was two-way transmission of knowledge between local people and researchers to interpret information in terms of their expectations, and their social and cultural understandings. In the next stage, the study was conducted onto 20 undergraduate students who enrolled in biodiversity class. These students were exposed to the scientific terms and local terms. The local terms refer to the common name used by the locals and the indigenous people. While the scientific terms were used commonly in science handbook. The set of description using scientific terms as shown in Table 1.0 were applied by instructor during the lesson. The instructor also used the terminologies stated in Table 2.0 to deliver the lesson using local description.

	Species	Group	Common Characteristic
Plant A	*Marchantia sp.*	Mosses	• Body form flattened • Have thallus and rhizoid
Plant B	*Nephelium loppaceum*	Angiosperms	• Borne in erect terminal panicles • Small gametophye matures in protected flowers • Large and wide leaves
Plant C	*Pinus*	Gymnosperms	• Have sporophyll • Most are monocious
Plant D	*Blotiella mannii*	Ferns	• Rhizome • Have fronds • Presence of sorus

Table 1.0 Description of Fresh Plants Used in Study (Scientific Terminologies)

	Species	Group	Common Characteristic
Plant A	*Marchantia sp.*	Mosses	• Body form flattened • Lobed structure • Hair like under lobed structure
Plant B	*Nephelium loppaceum*	Angiosperms	• Height between 10 – 20 feet • Large, wide and alternate leaves • Variation in colours: green, yellow and red
Plant C	*Pinus*	Gymnosperms	• Cone like structure • Male – female in different cone
Plant D	*Blotiella mannii*	Ferns	• True stem and root • Leaves have tubular sheath at the base which splits open on one side at maturity

Table 2.0 Description of Fresh Plants Used in Study (Local knowledge)

Instrument: Introduction to Biodiversity Test (pre-test and post-test)
The study utilized the following schedules and time frame (Table 3.0). The total weeks for conducting this study is 20 weeks. Prior to these activities, the researchers spent two weeks with the locals to gather the terms and terminologies.

Week	Activities
1-2	Collection of local terminologies with local peoples : *Orang Asli* and farmer
3-6	Instructor delivered the teaching using the scientific terminologies for Plant topic (Mosses and Ferns)
9	Pre-test
14-17	Instructor delivered the Plant topics (Angiosperms and Gymnosperms) using the scientific terminologies and description from the local knowledge
20	Post-test

Table 3.0 The Activities With the Time Frame Utilized in the Study

There were two tests used in the study; pre-test and post-test. Both tests consisted of twenty multiple-choice items. The tests were developed to test students' academic performance for Plant topic. The twenty items were drawn from Diploma in Science university syllabus. The validity of the test items was verified by experts in Biodiversity and Ecology fields.

Data Analysis
The data from the pre-and post-test were analyzed quantitatively using SPSS: dependent t-test to see the significant difference of the variables with confidence level p=0.05.

Results and Discussion

The study was conducted on 20 undergraduate students that comprised of 30% male and 70% were female. Using the collected data, the pre-post-test in plant identification shows an improvement in the accuracy after the students were taught using the terminologies and descriptions given by the local people. The number of respondents who give correct identification show an increase in the post-test of 11.25% for Plant A and 22.71% for plant B. Similarly, the respondents are able to successfully identify the characteristics in plant C and plant D with an increase of 25% and 28.34% respectively. The result is shown under Figure 1.0.
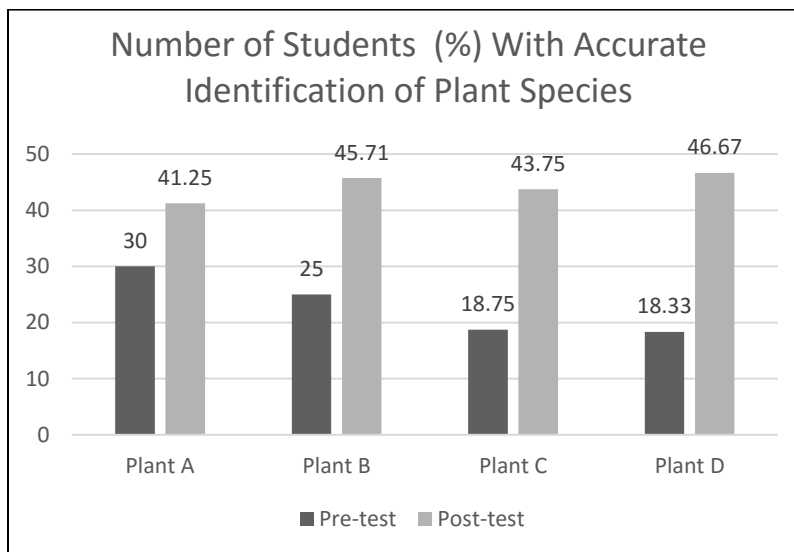

Figure 1.0 Percentage of Respondents Who Were Able to Accurately Identify the Sample in Pre-test and Post-test

In helping the respondents to get a better understanding on the identification of plant species during the lesson, the instructor also explained the characteristics that can be observed on the plant species when infested with pests. All the information is also obtained from local people. For example, the leaves of infested Plant B turned moldy and yellow in the presence of flies in the forest. Plant D is identified by the habitat of their growth. Basically, they grow wildly in the forest and the leaves have holes when infested by caterpillars. The result from the practice enables students to gain various collections of terminologies and descriptions which can be implemented in classroom instruction and proven to improve students' understanding. Most of the learners actively participated in the classroom discussion as they are familiar with the description from the local people. The increase in percentage of the accurate identification of the plants when the scientific description was blended with the local knowledge ideas proves that learners can learn effectively on realistic means; as the ideas were originated from the phenotypic view in general, such as the colours and the shapes of plants. (Chamaney, Allen & Tanner, 2008).

Next, dependent t-test was used to test the research hypothesis. There is a significant difference between the pre and post-test scores of students exposed with the local knowledge during the study of related plant species such that Plant A; t=-2.319, p=0.032, Plant B; t= -4.901,

p = 0.000, Plant C; t= -3.162, p = 0.05, Plant D;   t= -2.203, p= 0.04 (p < 0.05). With these results, Ho was therefore rejected. It further suggests that the improvement in test scores between the pre and post-test were not by chance, but rather a result of the blended local knowledge in the teaching methodologies. The result is shown in Table 2.0 – 5.0.

A: Mosses	N	Mean	SD	t-value	P
Pre-test	20	0.9	1.071	-2.319	0.032
Post-test	20	1.65	1.089		

Table 2.0 Dependent t-test for Identification of Plant A

B: Rambutan	N	Mean	SD	t-value	P
Pre-test	20	0.75	0.851	-4.901	0.00
Post-test	20	3.20	2.285.		

Table 3.0 Dependent t-test for Identification of Plant B

C: Pinus	N	Mean	SD	t-value	P
Pre-test	20	0.75	1.070	-3.162	0.05
Post-test	20	1.75	1.209		

Table 4.0 Dependent t-test for Identification of Plant C

D: Fern	N	Mean	SD	t-value	P
Pre-test	20	0.55	0.945	-2.203	0.04
Post-test	20	1.40	1.142		

Table 5.0 Dependent t-test for Identification of Plant D

This method applied the dialogic teaching which was proven to enhance critical thinking and learner retention (Alexander, 2006). Dialogic teaching emphasizes on the interactions among teachers and students, which encourage students to think in different ways as they have their own perspective and language. This includes questions and answer from both sides as well as exchanging ideas, and less of passive learning. During the learning session, the instructor explained the topic using scientific descriptions and terminologies but switched to descriptions gained from local peoples when giving further explanation. All the discussion used the observations as the identification character. The students discussed the details with the instructor when they needed further clarifications. The findings in this study is similar with previous study by Soleri et al (2013) which shows that local ecological knowledge has been proved to be highly accurate in the identification process of plants and animal species. In addition the previous study also showed a positive attitude among students towards identification of plant species via local knowledge and direct observation. Through the activity also increased the confidence among them to identify the plant species with their major healing functions (Esa & Jiwa, 2015).

Conclusion

The study utilizes local knowledge when describing plant species in the related subjects. Local knowledge is the knowledge held by local groups of people which are related to their personal knowledge, their own concept, and words based on their own experiences and various experiential processes. The findings of this study further attested to the effectiveness of blended local knowledge in the description of the species in increasing students' understanding of the subject. The implementation of the local terminologies is believed to shed light in improving teaching and learning. Instructors are able to increase their teaching skills and disseminate knowledge effectively. Thus benefit students and ensuring high performance. The course curriculum can be further reviewed to strengthen Diploma Program for Faculty of Applied Sciences. Thus achieve program outcome which highlight the ability of students to acquire and apply knowledge of science with implementing critical thinking and professionalism.

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