

Environmental Harmony and Carving Green Culture: Development of Adiwiyata Through in Vitro Culture of Orchid Plants at SMPN 17 Malang

Frida^{1*}, Balqis², Sulisetijono³, Mimien Henie Irawati⁴, Herawati Susilo⁵, Sofia Ery Rahayu⁶, Nursasi Handayani⁷, Sitoresmi Prabaningtyas⁸, Ringga Satria Putra⁹, Nina Aulia Rahmah Permata Sari¹⁰, Achmad Muktafi Shofhal Jamil¹¹

^{1,2,3,4,5,6,7,8,9,10,11} State University Malang

* E-mail: frida.fmipa@um.ac.id

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Abstract

The educational environment is a means to hone skills, shape character and make students have a dignified personality. Discipline attitudes and skills need to be developed in Project-based learning. Along with developments in the 21st Century, educational environment is required to be adaptive and responsive to changes that occur. Environment-based education is basically using the environment as the basis for educational orientation. One implementation of environmentally based education orientation can be realized through community service. Community service prioritizes community participation in the field of education. Teachers, committee teams, and students of SMP Negeri 17 Malang took part in a series of environment-based community service activities, especially in the development of Adiwiyata through cultural acclimatization in-vitro orchid. Acclimatization of orchid culture is one source of learning media in the Adiwiyata school environment which is useful in enriching environmental education in schools, supporting the preservation of biodiversity, and help create a green and sustainable environment. This activity aims to provide training on acclimatization of orchid culture and assistance in preparing integrated teaching modules on orchid culture for teachers at SMPN 17 Malang. This community service method uses methods Participatory Learning and Action (PLA). Community service activities were carried out at SMPN 17 Malang which began with providing information about orchid culture and acclimatization, independent curriculum, assistance in preparing teaching modules and acclimatization practices. Based on the results of community service activities, knowledge regarding orchid culture was increased and an integrated teaching module on orchid culture was produced. Environmentally based community service and adiwiyata development through orchid culture can increase community knowledge in the environmental field and increase teachers' abilities in creating integrated teaching modules on orchid culture.

Keywords: Adiwiyata; Orchid Culture; Teaching Module

Abstrak

Lingkungan pendidikan merupakan sarana untuk mengasah kemampuan, membentuk karakter dan menjadikan peserta didik memiliki kepribadian yang bermartabat. Sikap disiplin dan keterampilan perlu dikembangkan dalam pembelajaran berbasis Project. Seiring dengan perkembangan di Abad 21, lingkungan pendidikan dituntut untuk adaptif dan responsif terhadap perubahan yang terjadi. Pendidikan berbasis lingkungan pada dasarnya adalah menggunakan lingkungan sebagai basis orientasi pendidikan. Salah satu implementasi orientasi pendidikan berbasis lingkungan dapat diwujudkan melalui pengabdian masyarakat. Pengabdian masyarakat memprioritaskan partisipasi masyarakat dibidang Pendidikan. Guru,

tim komite, dan siswa SMP Negeri 17 Malang turut andil dalam rangkaian kegiatan pengabdian masyarakat berbasis lingkungan khususnya dalam pengembangan Adiwiyata melalui aklimatisasi kultur *in-vitro* anggrek. Aklimatisasi kultur anggrek merupakan salah satu sumber media pembelajaran di lingkungan sekolah adiwiyata yang bermanfaat dalam memperkaya pendidikan lingkungan di sekolah, mendukung pelestarian keanekaragaman hayati, dan membantu menciptakan lingkungan yang hijau dan lestari. Kegiatan ini bertujuan untuk mengadakan pelatihan Aklimatisasi kultur anggrek dan pendampingan penyusunan modul ajar terintegrasi kultur anggrek bagi Guru SMPN 17 Malang. Metode pengabdian masyarakat ini menggunakan metode *Participatory Learning and Action* (PLA). Kegiatan pengabdian masyarakat dilakukan di SMPN 17 Malang yang diawali dengan memberikan informasi mengenai kultur anggrek dan aklimatisasi, kurikulum merdeka, pendampingan penyusunan modul ajar dan praktik aklimatisasi. Berdasarkan hasil kegiatan pengabdian masyarakat diperoleh peningkatan pengetahuan mengenai kultur anggrek dan dihasilkan modul ajar terintegrasi kultur anggrek. Pengabdian masyarakat berbasis lingkungan dan pengembangan adiwiyata melalui kultur anggrek mampu meningkatkan pengetahuan masyarakat dibidang lingkungan serta meningkatkan kemampuan guru dalam membuat modul ajar terintegrasi kultur anggrek.

Kata Kunci: Adiwiyata Kultur Anggrek; Modul Ajar

INTRODUCTION

The educational environment is a means to hone skills, shape character and make students have a dignified personality. Discipline attitudes and skills need to be developed in Project-based learning. Along with developments in the 21st Century, the educational environment is required to be adaptive and responsive to changes that occur. Environment-based education is basically using the environment as the basis for educational orientation. Acclimatization of orchid culture is one of the sources of learning media in the adiwiyata school environment that can be raised in the learning process. The integration of orchid culture acclimatization in the adiwiyata program can enrich environmental education in schools, support biodiversity conservation, and help create a green and sustainable environment (Muhammad Syukur, 2021). The Adiwiyata program in the form of in-vitro orchid culture can be carried out optimally if the learning environment is sustainable, students' enthusiasm for learning is high and students' concern for the environment is high. Therefore, a useful community service method is needed to facilitate the adiwiyata program, namely Participatory Learning and Action (PLA). The "orchid garden school" program is expected to increase knowledge and make a positive contribution to environmental conservation and sustainable development efforts at the local and national levels.

Orchids are plants from the genus Orchidaceae which are known for the beauty and beauty of their flowers. This flower is widely enjoyed because it has unique shades, colors and types so it is famous among ornamental plant lovers. Therefore, the orchid flower market has become a source of business in the field of hobby and conservation (Ambarwari *et al.*, 2021). Orchid plants have high economic value, both as potted flowers, cut flowers and decorating houses and yards. The economic value of orchid flowers is determined by several things, including the type, shape, texture, color, flower size, rate of flowering frequency and rarity. Orchid seedlings in culture bottles come from orchid seeds that are sown aseptically in vitro on an artificial medium that contains energy, nutrients and complete organic compounds necessary for germination and growth of protocorm into seedling. Orchid seedlings that have been grown in culture

bottles have become accustomed to living in aseptic conditions and have sufficient energy and nutrients available in the culture medium. Therefore, in order for orchid seedlings to propagate in vitro requires a stage of adjustment to the new environmental stress, called the acclimatization stage (Yasmin *et al.*, 2018)

General description

SMP Negeri 17 Malang is located on Jalan Pelabuhan Tanjung Priok 170, Sukun District, Malang City, East Java. The location of the junior high school is quite comfortable, located in the suburbs of Malang which is still beautiful and close to several housing that is being developed. One of the visions of SMP Negeri 17 Malang is the realization of people who have a culture of caring for the environment and the mission related to this vision is to realize a culture of caring for the environment that is green, beautiful, clean, healthy, and beautiful; complete school infrastructure facilities in accordance with school development programs; and create a culture of preventing environmental damage. Based on the vision and mission related to this, SMP Negeri 17 Malang implements the Adiwiyata program as a national program in Indonesia which aims to encourage schools to develop and implement activities oriented to environmental conservation, sustainable development, and instilling sustainability values in daily life. Schools that implement the Adiwiyata Program are expected to be able to solve several environmental problems from an early age through schools (Hermawan & Mahmudah, 2023).

Problem

The Adiwiyata program at SMP Negeri 17 Malang is carried out in several working groups (POKJA), such as the POKJA on cleanliness and sanitation, the POKJA on waste management and recycling, the POKJA on planting, tree maintenance and nursery, and the POKJA on water and energy conservation. SMP Negeri 17 still wants to develop an adiwiyata program that can touch the character of students and create a superior program that brings out the school's branding and characteristics. SMP Negeri 17 Malang is trying to propose an "orchid garden school" program that is expected to facilitate learning about organic agriculture and sustainability through school gardens. To facilitate the adiwiyata program, programmatic and sustainable coaching and education are needed to create a sustainable learning environment and increase environmental awareness among students, teachers, staff, and in schools. The "orchid garden school" program is expected to make a positive contribution to environmental conservation and sustainable development efforts at the local and national levels. However, in its implementation, there are still many obstacles that occur. Frequent obstacles such as limited resources, lack of awareness and understanding related to sustainable development and the importance of environmental protection, as well as lack of awareness in overcoming and recycling bottle waste. Therefore, the implementation between orchid cultivation and the Adiwiyata program can be an interesting learning tool in the context of the Independent Curriculum, because orchid cultivation does not require a large area of land to grow (Dewanti *et al.*, 2021). Integrating orchid culture and the Adiwiyata program in the Independent Curriculum, education becomes more diverse, interesting, and relevant for students. Students will not only learn about the local environment and culture, but also develop the skills, values, and attitudes necessary to become caring and responsible Indonesian citizens for the future of this earth (Aprilianto, 2020).

Target solution

The solution that can be given to solve this problem is to provide in vitro orchid cultivation skills training to teachers and students of SMP Negeri 17 Malang and the development of learning in the form of teaching modules. Teaching modules can also be interpreted as learning

tools or learning designs based on the curriculum that is applied with the aim of achieving predetermined competency standards (Nurdyansyah, 2018). Orchid cultivation starts from the acclimatization of bottled orchid seedlings followed by the maintenance of seedlings in compotes, individual seeds, juvenile and adult plants until flowering while learning development is by involving teachers in designing learning related to adiwiyata, especially orchid plant cultivation. The expected target of the orchid cultivation training is to be able to utilize plant maintenance land that has not been used optimally and involve teachers in designing learning related to adiwiyata, especially about orchids and involving students in orchid care and environmental maintenance (Andina, 2019).

METHOD

This community service uses Participatory Learning and Action (PLA) methods, placing equal value on community knowledge and experience to provide solutions to existing problems. The subjects of this community service are teachers, committee teams and students, each of whom from each level of society will learn material that is useful in their environment, such as teachers learning how to create integrated teaching modules, committee teams and students learning about acclimatization so that it can be applied in the school and other environment to improve cultivation of orchids. This activity uses an empowerment approach through orchid culture acclimatization training and assistance in making Teaching Modules by raising orchid culture acclimatization as teaching modules adiwiyata based. The initial stage is carried out through the delivery of material by the community service team regarding the Orchid culture acclimatization material, assistance in the preparation of integrated teaching modules for orchid culture, and the practice of orchid culture acclimatization training. Furthermore, direct training on orchid culture acclimatization with partners involved the students, fathers and mothers of teachers at SMPN 17 Malang. Before the training, a pretest is held and after the training, a pos, test is held. The next stage is assistance in making teaching modules that integrate orchid culture in adiwiyata. The presence and active participation of partners is evaluated in the form of pretest and posttest results, then displayed in the average form, and then statistically analyzed.

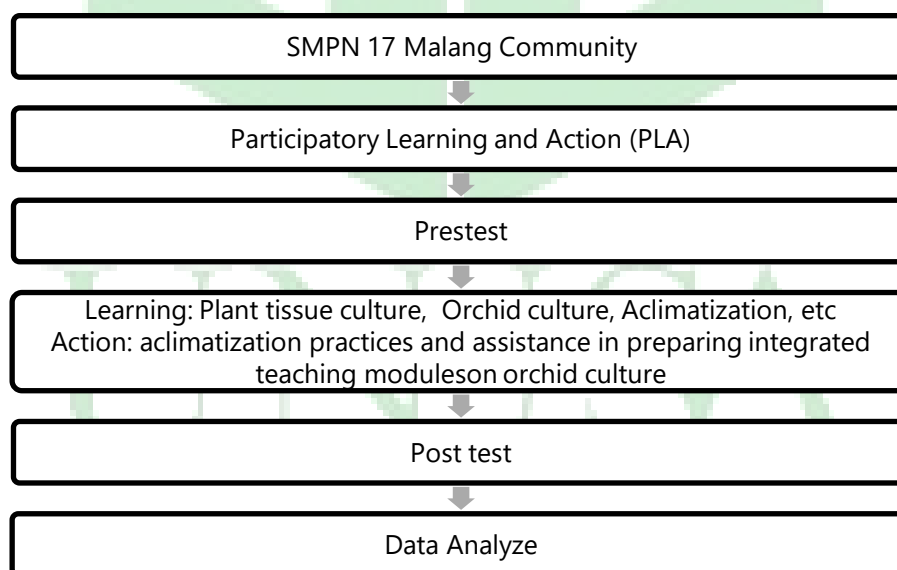


Figure 1. Community services method

RESULTS AND DISCUSSION

The Orchid Culture Acclimatization Workshop and Training was held at SMP Negeri 17 Malang involving teachers, Committee Team and 30 students who attended offline, as well as a community service team consisting of 7 lecturers, and 5 biology students. In the 2024 Orchid Culture Acclimatization Service Activity, before the training, a pretest was carried out first which was followed by posttests after the training was completed. Pretest or initial test is a test that is carried out with the aim of finding out to what extent the material or material to be explained can be mastered by the participants. Meanwhile, Post-test or final test is a test that is carried out with the aim of finding out whether all important material can be mastered as well as possible by participants (Siregar *et al.*, 2023). The methods and strategies used by providing Pre-test and Post-test can help teachers to evaluate and improve teaching activities and methods as well as providing Pre-test and Post-test can increase student motivation and interest in learning as well as readiness in learning activities so that learning outcomes can increase student motivation and interest in learning as well as readiness in learning activities so that learning outcomes can increase (Effendy, 2016). The average formula is used in finding the average of each existing record. Pre-test and Pos-test data are divided into three categories, namely teachers, committee teams, and student's. The results of the teacher's pretest and posttest are presented in Table 1.

Table 1. Average Teacher's Pretest and Posttest Results

No	Pretest	Posttest	Average
1	64	92	78,00
2	76	96	86,00
3	64	88	76,00
4	64	92	78,00
5	64	88	76,00
6	72	96	84,00
7	56	96	76,00
8	36	92	64,00
9	40	96	68,00

Based on the average results in the table above, a further test is needed in the form of paired t-test. The paired t-test was analyzed using Microsoft Excel.

Table 2. Hasil Uji t-Test: Paired Two Sample for Means

	Pretest	Posttest
Mean	59,5556	92,8889
Variance	181,7778	11,1111
Observations	9	9
Pearson Correlation	-0,0346	
Hypothesized Mean Difference	0	
df	8	
t Stat	-7,142857	
P(T<=t) one-tail	0,000049	
t Critical one-tail	1,859548	
P(T<=t) two-tail	0,000098	
t Critical two-tail	2,306004	

Based on the table above, it can be seen that the two-tail $P(T \leq t)$ is smaller than the alpha value of 0.05. Thus, it can be concluded that there is a significant difference between the pretest and posttest in orchid culture acclimatization training for the development of teaching materials in the form of modules based adiwiyata. The results of the committee teams pretest and posttest are presented in Table 3.

Table 3. Average committee teams Pretest and Posttest Results

No	Pretest	Posttest	Average
1	72	88	80,00
2	44	84	64,00
3	88	96	92,00
4	84	92	88,00
5	92	96	94,00
6	76	88	82,00

Based on the average results in the table above, a further test is needed in the form of paired t-test. The paired t-test was analyzed using Microsoft Excel.

Table 4. Hasil Uji t-Test: Paired Two Sample for Means

	Pretest	Posttest
Mean	76	90,6667
Variance	300,8	23,4667
Observations	6	6
Pearson Correlation	0,9141	
Hypothesized Mean Difference	0	
df	5	
t Stat	-2,75	
P(T<=t) one-tail	0,02016	
t Critical one-tail	2,01505	
P(T<=t) two-tail	0,04031	
t Critical two-tail	2,57058	

Based on the table above, it can be seen that the two-tail $P(T \leq t)$ is smaller than the alpha value of 0.05. Thus, it can be concluded that there is a significant difference between the pretest and posttest in orchid culture acclimatization training for the development of teaching materials in the form of modules based adiwiyata. The results of the student's pretest and posttest are presented in Table 5.

Table 5. Average student's Pretest and Posttest Results

No	Pretest	Posttest	Average
1	28	48	38,00
2	28	48	38,00
3	24	64	44,00
4	16	48	32,00
5	16	40	28,00
6	40	76	58,00
7	36	76	56,00
8	36	76	56,00
9	28	68	48,00

10	40	88	64,00
11	36	80	58,00
12	24	66	45,00
13	32	52	42,00

Based on the average results in the table above, a further test is needed in the form of paired t-test. The paired t-test was analyzed using Microsoft Excel.

Table 6. Hasil Uji t-Test: Paired Two Sample for Means

	Pretest	Posttest
Mean	29,538	63,846
Variance	65,436	230,974
Observations	13	13
Pearson Correlation	0,799	
Hypothesized Mean Difference	0	
df	12	
t Stat	-12,376	
P(T<=t) one-tail	0,000000017	
t Critical one-tail	1,782287556	
P(T<=t) two-tail	0,000000034	
t Critical two-tail	2,179	

Based on the table above, it can be seen that the two-tail $P(T \leq t)$ is smaller than the alpha value of 0.05. Thus, it can be concluded that there is a significant difference between the pretest and posttest in orchid culture acclimatization training for the development of teaching materials in the form of modules based adiwiyata. Therefore, the provision of pretest and posttest is one of the indicators of success. The average can be used as a success criterion, including 81-100 (very good), 61-80 (good), 41-60 (not good), 21-40 (not good), and 0-20 (very bad) (Arikunto, 2010).

The average results of the pretest and posttest of teachers and committees are relatively good, because they have a score of 64,00 – 94,00. In tables 1 and 3, it can be seen that after the posttest, the score obtained is better than the pretest score. Therefore, the pretest and posttest methods are very relevant to be used in this service, because it can find out how the participants understand the material before and after being delivered. It is different with the average score of the pretest and posttest for students. In table 5, it can be seen that the lowest average with a score of 28,00 and the highest average with a score of 64,00. Although the results of the posttest have an increase compared to the results of the pretest. This is because junior high school students do not understand much about plant tissue culture, as well as related to the age and experience of their students. However, in terms of skills, junior high school students have been able to do and apply it directly (Arikunto, 2010).

Project-based learning involving several disciplines has the potential to be implemented at Adiwiyata School. Tree/plant planting activities such as orchid maintenance and care can involve at least two disciplines, namely agriculture and science. The number of disciplines involved in a learning can be planned by teachers and become a new approach to learning. (Fatimah *et al.*, 2022). The development of teaching modules with project-based learning is part of learning planning, namely the activity of formulating learning outcomes, as well as ways to achieve and assess learning objectives (Menteri Pendidikan Kebudayaan Riset dan Teknologi, 2022). Project-based learning in the context of the Adiwiyata program is an

approach that integrates environmentally friendly concepts into teaching and learning activities. The main goal of the Adiwiyata program itself is to create a school that cares about and has an environmental culture, so project-based learning here focuses on increasing students' awareness and participation in maintaining and preserving the environment so that they can work independently, and integrate cross-disciplinary concepts (Tusi Fatimah *et al.*, 2024).

CONCLUSIONS AND SUGGESTIONS

The orchid culture acclimatization training was carried out offline at SMPN 17 Malang with the participation of participants consisting of teachers, committee teams and students. Preparation of an integrated teaching module for acclimatization of orchid culture based on adiwiyata. The results of this activity showed that the method used in the form of PLA was very effective because there was an increase in the knowledge of teachers, committee teams and students regarding orchid culture acclimatization as evidenced by the post-test scores being higher than the pre-test scores. In addition, the practical abilities of teachers, committee teams and students are improved through acclimatization experiences and creating teaching modules. It is carried out in groups according to the field of expertise, and once a week is asked about the progress of the preparation of the Integrated Teaching Module for Acclimatization of Orchid Culture Based on Adiwiyata. Environment-based community service and adiwiyata development through orchid culture can increase community knowledge in the environmental field and increase teachers' abilities in creating integrated teaching modules on orchid culture.

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