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Sustainable food yard activities at RA Miftahussalam Adiwiyata School to support english, science, and math literacy of young learners

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Abstract
Early childhood education is an important period in a child's development. During this time, children are curious and enjoy learning through play. This is the perfect opportunity to impart various knowledge and skills, including English, science and mathematics. The Sustainable Food Yard (P2L) in Adiwiyata schools can be an effective medium to improve the English, science and maths literacy of early childhood students. P2L provides a contextual and fun learning space for students to learn about various things such as plants and the environment. This community service activity was aimed to 1) Provide field learning experiences through plant media; 2) Improve English literacy skills through contextualised plant media integrated with learning; 3) Raise awareness among RA Miftahussalam students about eating vegetables that can be grown on limited land; 4) Raise awareness about the importance of protecting the environment; 5) Support Adiwiyata schools in achieving their goal which was encouraging the creation of knowledge and awareness among school members in environmental protection efforts through the environmental care and culture movement at school. This activity was carried out using the mentoring method. The team assisted RA Miftahussalam students and teachers in learning how to plant on limited land, learn English, science and basic mathematics with plant media and use the results. The result of this community service gave students and teachers experience of good practices from P2L activities by planting and eating vegetables grown around them. The results of this assistance become a reference for innovative learning at the RA Miftahussalam to be further developed to support environmentally friendly behavior at Adiwiyata schools.

Keywords: *English literacy; Hydroponic; Math literacy; Science literacy; Young learner*

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INTRODUCTION

Raudhatul Athfal (RA) Miftahussalam is one of the Adiwiyata Schools in Ciamis Regency. Adiwiyata School is a school that promotes increased knowledge and awareness of the school community in environmental conservation efforts through the school-based environmental and cultural movement (PBLHS) (Kementrian Lingkungan Hidup dan Kehutanan, 2019b). Adiwiyata School at TK/RA level is a breakthrough by the local government of Ciamis Regency and is the only one in West Java, as the Adiwiyata programme is currently being implemented in primary and secondary schools (Herlina, 2022). However, RA Miftahussalam is the first school to receive the Adiwiyata Award at the Ciamis level. The award was received in 2021. Currently, RA Miftahussalam is preparing for Adiwiyata at the provincial level.

RA Miftahussalam's vision is "The realization of a pious, joyful, and environmentally friendly generation." To create environmentally conscious students, RA Miftahussalam is integrating environmentally friendly behavior (PRLH) into the learning process. PRLH starts with putting rubbish in the right place according to the color of the bin and watering the plants. Despite that, RA Miftahussalam needs innovation to improve the Adiwiyata program integrated into learning.

RA Miftahussalam has 3 x 6 meters of land that can be used to improve the Adiwiyata program in terms of planting and maintaining trees and plants. The plants that have been planted and maintained so far

are mainly ornamental. Some plants have medicinal properties, such as cat whisker plants. Meanwhile, RA Miftahussalam has a desire to introduce vegetables to the students through vegetable gardening activities as its identification, the majority of the students do not like vegetables.

Students are the Adiwiyata cadres in the implementation of the PRLH. Adiwiyata cadres are students who are identified and encouraged by the teacher to play an active role in mobilizing school residents and surrounding communities to implement environmentally friendly behavior (Kementrian Lingkungan Hidup dan Kehutanan, 2019a). RA students as Adiwiyata cadres certainly still have limitations. Therefore, teacher support is needed in the form of learning integration with the P2L program.

In addition, the implementation of an independent curriculum to achieve the basics of literacy, mathematics, science, technology, engineering, and the arts (Permendikbudriset, 2024) is part of the intra-curricular curriculum structure that needs to be implemented. RA Miftahussalam needs learning facilities with the principle of implementing meaningful play that provides space for exploration so that it is useful in developing children's character and skills. The teaching of English at RA Miftahussalam is very limited. This is due to the lack of teachers who have an English background, whereas if students want to have good English skills, it is very good if they are honed from an early age (Erk & Ručević, 2021; Jahrani & Listia, 2023; R. P. Lestari et al., 2021) so that they get enough acclimatization.

In many countries, English is taught in pre-primary settings like kindergarten and preschool. Teaching English to young learners helps them develop language skills during their prime learning years. Children can learn anything as long as it is presented in a comprehensible format. Teaching English also promotes enjoyment and motivation for language learning, particularly when presented in a fun manner. In addition, children can promote learning about other cultures while also developing their cognitive skills and metalinguistic awareness (Cahyati et al., 2019). In this case, teachers play the most essential role in creating a positive emotional environment in the classroom.

According to the survey, science and mathematics learning in RA Miftahussalam are not integrated, so students are not used to contextual learning. So far, students learn numbers only in the context of pure mathematics. Meanwhile, early childhood is very helpful for learning in context (Watini, 2019). Especially in certain contexts, learning science and mathematics affects children's critical thinking skills (Latifah et al., 2024). These became the essential points to integrate those three different things, which are English, Science, and Math.

In learning through the contextual approach, the material is presented in a variety of contexts and related to students' lives at home, at school, and in the community at large, and knowledge is acquired by students in a constructivist way. In science, activities taught using the contextual approach had a higher average score than those taught using the conventional approach (Sumiyati, 2010; Watini, 2019).

STEAM (Science, Technology, Engineering, Art, Mathematics) has recently been seen as an approach to preparing for the 21st century (Munawar & Roshayanti, 2019), aiming to stimulate creativity and prepare children for a world of innovation and invention. This starts with the importance of STEM education, which has been embraced by one of the most developed countries, the United States. Furthermore, research shows that there is a positive relationship between early STEAM experiences and future academic success (Fatimah et al., 2022; D. Lestari et al., 2023). In addition, this community service integrates science and mathematics components, which lie on STEAM, with foreign language skills, especially English, so that the level of national and international Adiwiyata schools is possible to achieve.

In this community service against the background of the school's problems, this community service was carried out focused on contextual learning to grow hydroponic vegetables, especially through the wick system, to improve English, science, and mathematics skills. This activity was suitable for early childhood learning as it could integrate three areas of knowledge through fun but very meaningful activities.

METHODS

The implementation activities of community service were carried out at Raudhatul Anfal (RA) Miftahussalam. This community service focused on assisting students with English, Science, and Math literacy who are in their second year of school. At the same time, the team assisted teachers with outside

classroom activities. The activities were performed from June to August 2024. The second-year students at the school who participated were 50 students and all six teachers who were in that school.

There were three different stages of development activities those are preparation, implementation, and evaluation. The initial activity, which is preparation, began with a focus group discussion with teachers to prepare the sort of teaching media to grow hydroponic vegetables. The implementation, which is focused on the students, started with giving some kind of English, science, and math literacy on tools and materials related to learning, such as English names, types of vegetables to grow, and number learning with realia. The evaluation stage was for the entire activities to begin with the appropriateness of learning the equipment, implementation, and assessment.

After accomplishing a series of activities, reflection on the recent topic was done to see how far and effective the community service provided a slightly different learning experience through growing hydroponic vegetables using the wick system. That was carried out through a distribution of questionnaires on the activity.

RESULTS AND DISCUSSION

One of the outcomes of this community service activity was to improve the quality of out-of-classroom learning. This activity involves the active participation of students and teachers in learning through learning facilities/media that support Adiwiyata Schools, namely planting hydroponic vegetables using a wick system. Before carrying out the sowing and transplanting activities, the students shared their learning experiences about numbers and vegetables in English.

As explained in the previous section, this community service activity was divided into several stages and meetings. In the first stage, before planting hydroponic vegetables with a wick system to blend English, science, and maths learning, the students were given knowledge about vegetables in English. This was done by introducing the types of vegetables in the classroom. After that, the community service team, accompanied by the RA teachers, carried out this step to identify the types of vegetables they wanted to know about and to ensure the RA students' understanding of vegetables that could be used in the future. In addition, the team also reinforced learning mathematics using English (Figure 1).

Figure 1. Learning kinds of vegetables and math

The results obtained by the students from the implementation of this community service were knowledge and introduction to English, science, and mathematics through growing hydroponic vegetables. This community service also provided teachers with an overview of how to use authentic learning media for maximum student engagement (Alalwan, 2022; Kurniawati & Fauziyah, 2022). The integration of

English, science, and basic mathematics in early childhood education was fully presented to provide experience and practice for both RA students and teachers.

All the activities and learning outcomes for growing hydroponic vegetables with an integrated wick system with improved English, science, and maths skills are outlined in Tables 1-3 below.

Table 1. Learning outcomes of Mathematics taught in English

Activity	Outcomes
List numbers 1-12 in English	100%
Sort numbers 1-12 in English	100%
Answer numbers operation shown in English	100%

Table 2. Learning outcomes of Science taught in English

Activity	Outcomes
Mention vegetables in English	100%
Match vegetables in bahasa Indonesia to English version	100%
Identify vegetables in certain dishes	100%

After the English vegetable learning activity, the team, assisted by the RA teacher, prepared the tools and materials that would be used as sowing media and teaching media in the second session. On this occasion, the materials needed to grow hydroponic vegetables included vegetable seeds of spinach, *pokcoy*, water spinach, water, and AB mix fertilizer. The materials include plant trays, rockwool, pencils, net pots, and impraboard, which can be seen in the following figures.

Figure 2. Hydroponic farming tools and materials

In the session of learning numbers listed in Table 1, it can be seen that the numbers taught were 1 to 12. This was influenced by RA students who were about to move up to class B or were entering their second year of learning. It was also related to the teaching media used when learning to grow vegetables with a hydroponic wick system, especially *impraboard*. In order not to confuse the students in their learning, the community service team decided to provide learning experiences of numbers in English 1-12 according to the realia used.

Research indicated that using realia in teaching English to young learners is highly effective for vocabulary acquisition and overall language development. Realia helps engage students in the learning process, maximizes their multi-sensory experience, and enhances communication skills (Sitepu & Kurniawati, 2021). It makes learning more memorable, encourages active participation, and maintains student interest (Mokalu, 2022). Studies have shown that realia is particularly beneficial for teaching and assessing vocabulary, offering comprehensible input to young learners (Segundo et al., 2009). These findings suggest that realia is an effective methodological tool for teaching English to young learners, contributing to their vocabulary development and overall language proficiency.

As it has been mentioned earlier, there are several steps in growing vegetables. Those are illustrated in Table 3 for the learning outcomes.

Table 3. Students' participation in growing hydroponic vegetable

Activity	Students' participation
Sowing vegetable seeds	100%
Make seed holes in rockwool	100%
Wet the rockwool	100%
Putting the seeds in the holes in the rock wool	100%
Place pieces of rockwool (seedling results) in the net pot.	100%
Observe vegetable growth	60%
Harvesting the vegetables	Not done yet

The data in Table 3 were obtained after learning about numbers and science, especially the kinds of vegetables. Thus, when the students started to practice growing vegetables with some English vocabulary, they started to combine their background knowledge and the activity of growing vegetables with the hydroponic system wick. At this stage, the team started the sowing activity together. The students were divided into groups of 4-5. The community service team and the teachers accompanied the students in this vegetable seedling activity.

Based on activity observations, which are also part of Table 3, participants, including community members, students, and teachers, generally showed positive responses and increased knowledge after attending these programs. Hydroponic wick systems have been successfully used to teach vegetable cultivation in various educational settings. Studies have demonstrated their effectiveness in introducing agricultural concepts to elementary school students (Mardiyana et al., 2021), high school students (Eddy et al., 2019), and community members (Hidayat et al., 2023; Wahyuningsihi et al., 2023).

Based on the previous community service activities, not many had implemented learning through growing hydroponic vegetables at the RA level and, more specifically, in Adiwiyata Schools. Therefore, this community service activity added new references related to the recent topic while helping to realize Adiwiyata Schools that encouraged the creation of knowledge and awareness of school residents in efforts to preserve the environment through environmental care and cultural movements at school (Kementrian Lingkungan Hidup dan Kehutanan, 2019b). Likewise, the background of children aged 4-6 who are less fond of eating vegetables would be improved by their participation in the preparation or selection of vegetables that they will be able to consume later.

The wick system was particularly useful in areas with poor soil conditions, such as coastal regions with sandy soil (Hidayat et al., 2023; Wahyuningsihi et al., 2023). This method utilized simple materials like plastic bottles and husk charcoal as growing media (Eddy et al., 2019). Training programs typically

cover seed sowing, nutrient preparation, system assembly, and plant maintenance (Eddy et al., 2019; Wahyuningsihi et al., 2023). Participants consistently showed increased knowledge and skills in hydroponic cultivation following these interventions (Hidayat et al., 2023; Wahyuningsihi et al., 2023). The wick system approach has been found to generate interest and enthusiasm among learners while promoting sustainable agricultural practices (Mardiyana et al., 2021; Wahyuningsihi et al., 2023). Growing vegetables using a wick system is effective for learning numbers and kinds of vegetables in English.

However, this community still found its obstacle. The most common of them was a lack of discipline. The teachers and the students sometimes forget to check the water level in the hydroponic tank so that the plants do not lack the nutrients supplied by the wick. Moreover, many students played on the plants, so many died before reaching their full potential.

CONCLUSION

The Adiwiyata school program aims to foster environmental awareness and support sustainable development among students. One of the actions to achieve the program is the innovation of sustainable food yards that have been implemented through growing vegetables with a hydroponic wick system. Growing vegetables with a hydroponic wick system, which needs simple materials and tools, can simultaneously raise students' awareness, and English literacy, which has not been exposed in young learners, can be integrated with other fields of learning, science, and maths learning for this case.

Limitations and Future Direction

The community service implementation of a recent topic was carried out throughout 2024. The description of this community service activity needs to be presented and published in an academic paper so that the outcomes of the activity can be measured and become an innovation to support the improvement of English, science, and mathematics literacy for RA students classified as Adiwiyata school.

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Statement and Declarations

The description of the activities shown in the images and all content have been permitted by Raudhatul Anfal Miftahussalam for publication in this article.

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