i-SPiKE 2023

INTERNATIONAL EXHIBITION & SYMPOSIUM ON PRODUCTIVITY, INNOVATION, KNOWLEDGE & EDUCATION

"Optimizing Innovation in Knowledge, Education and Design"

EXTENDED ABSTRACT

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EXTENDED ABSTRACT

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7.	GREEN As Model Urban Gardening in School *Nayudin Hanif*	748-756
8.	IOT Flood Monitoring System *Vimalan Pillai A/L Vajathan, Sachinn A/L Dhinagaran, Timothy Nathan A/L Thivianathan, Shaarveen A/L Tamilamuthan & Sanjay A/L Govindasamy*	757-760
9.	River Cleaning Robot *Yalleni A/P Thayalan, Indujaa A/P Kanaga Naidu, Yogini A/P Venugopal, Sarvina A/P Sasikumar & Thanishka Nair A /P Vimalan*	761-764
10.	IOT Based Smart Street Lighting System *Shivani Balakrishnan, Darshan A/L Kalidassen, Maniggandan A/L Manimaran, Shweta A/P Sivakumar & Darshanasri Vishnu*	765-768
11.	IOT Smart Irrigation Monitoring and Controlling System *Thanissa A/P Ganason, Lim Mei Lin, Sagunthali A/P Baskaran, Prishaashree A/P R N Raju & Guruprasath A/L Nanthakumar*	769-772
12.	Smart Waste Management System with IOT Monitoring *Sachein A/L Kalitazan, Suvarshan A/L Muniswaran, Sheshan A/L Velan, Suvathithan A/L Muniswaran & Dhanesh Shah*	773-777
13.	Smart Aquaponic Garden with an IOT Monitoring System *T. Yuvan Raj, C. Divashen, K. Nishart Pillaiy, S. Pretthic & S. Rishwin*	778-781
14.	Solar Tracker with IOT Monitoring *Saathish A/L Kumaran, Abinayashri A/P Srikanth, Hashini A/P K. Navukkarasu, Karthigeyan Utamanseelan & Hamshini A/P Ravachandran*	782-785
15.	Morusscented Candle *Farehan Binti Fauzi, Lam Mei Shan, Muhamad Haziq Bin Azizan, Syahzanani Binti Mohd Kamal & Muhamad Syamil Bin Zulkhairi*	786-788
16.	Paper Mache Mini Whiteboard *Keerthika A/P Thinesh, Ahvinaash A/L Vasu & Thanisha Sri A/P Balasingam*	789-792
17.	Brain Booster *Mohana Murugayan, Loghen Rajakumar & Udayaraj Gobinath*	793-797

Assalamualaikum warahmatullahi wabarakatuh,

First and foremost, I would like to express my gratitude to the organizing committee of i-Spike 2023 for their tremendous efforts in bringing this online competition a reality . I must extend my congratulations to the committee for successfully delivering on their promise to make i-Spike 2023 a meaningful event for academics worldwide.

The theme for this event, 'Optimizing Innovation in Knowledge, Education, and Design,' is both timely and highly relevant in today's world, especially at the tertiary level. Innovation plays a central role in our daily lives, offering new solutions for products, processes, and services By adopting a strategic approach to 'Optimizing Innovation in Knowledge, Education, and Design,' we have the potential to enhance support for learners and educators, while also expanding opportunities for learner engagement, interactivity, and access to education.

I am awed by the magnitude and multitude of participants in this competition. I am also confident that all the innovations presented have provided valuable insights into the significance of innovative and advanced teaching materials in promoting sustainable development for the betterment of teaching and learning. Hopefully, this will mark the beginning of a long series of i-Spike events in the future.

It is also my hope that you find i-Spike 2023 to be an excellent platform for learning, sharing, and collaboration. Once again, I want to thank all the committee members of i-Spike 2023 for their hard work in making this event a reality I would also like to extend my congratulations to all the winners, and I hope that each of you will successfully achieve your intended goals through your participation in this competition.

Professor Dr. Roshima Haji Said
RECTOR
UiTM KEDAH BRANCH

WELCOME MESSAGE (i-SPiKE 2023 CHAIR)

We are looking forward to welcoming you to the 3rd International Exhibition & Symposium on Productivity, Innovation, Knowledge, and Education 2023 (i-SPiKE 2023). Your presence here is a clear, crystal-clear testimony to the importance you place on the research and innovation arena. The theme of this year's Innovation is "*Optimizing Innovation in Knowledge, Education, & Design*". We believe that the presentations by the distinguished innovators will contribute immensely to a deeper understanding of the current issues in relation to the theme.

i-SPiKE 2023 offers a platform for nurturing the next generation of innovators and fostering cutting-edge innovations at the crossroads of collaboration, creativity, and enthusiasm. We enthusiastically welcome junior and young inventors from schools and universities, as well as local and foreign academicians and industry professionals, to showcase their innovative products and engage in knowledge sharing. All submissions have been rigorously evaluated by expert juries comprising professionals from both industry and academia.

On behalf of the conference organisers, I would like to extend our sincere thanks for your participation, and we hope you enjoy the event. A special note of appreciation goes out to all the committee members of i-SPiKE 2023; your dedication and hard work are greatly appreciated.

Dr. Junaida Ismail
Chair
3rdInternational Exhibition & Symposium Productivity, Innovation, Knowledge, and Education 2023 (i-SPiKE 2023)

GREEN AS MODEL URBAN GARDENING IN SCHOOL

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ABSTRACT
This research titled "GREEN As Model Urban Gardening In School" focuses on creating a comprehensive model for GREEN media integration. The model development involves conceptualizing a garden, planning through Project Based Learning, preparing resources, and involving the school community. The implementation encompasses media creation, seed sowing, nurturing, monitoring, harvesting, and promotion. The school garden serves as a vital learning medium, fostering biodiversity, food production, and nutritional awareness. It enhances psychosocial attitudes, responsibility, dietary habits, and academic achievements. The garden's benefits encompass physical health, academic excellence, positive environmental attitudes, and social connections. Various subjects are taught using garden elements, supporting interdisciplinary learning. Research methods encompass design, setting, samples, data collection, analysis, and reporting. Experimental design via Project Based Learning engaged high school students in extracurricular activities. Tools such as manure, seeds, trays, and agricultural equipment were utilized. The study was conducted at the Indonesian School of Kota Kinabalu, Sabah, Malaysia. The number of samples studied were 34 people from class X Science, X SMK Culinary, and X SMK Hospitality. Data collection techniques using Likert Scale questionnaire instruments, interviews, and pretest-posttest (OGDE). The collected data were analyzed using the statistical description method. Data collection employed Likert Scale questionnaires, interviews, and pretest-posttest analysis. Results showed that the GREEN integrated model significantly improved students' knowledge scores from 64.85 to 76.77. Students found the model engaging and user-friendly. They agreed that the GREEN model effectively promotes biodiversity, food, and learning experiences via school gardens. Furthermore, the model enhances activities and nutritional intake through fruits and vegetables. The study contributes to sustainable education approaches, enriching students' understanding of biodiversity, food, and nutrition.

Keywords: GREEN, Garden, Biodiversity, Food, Nutrition

INTRODUCTION

The school garden has a role as a valuable learning medium (Ohly H, et. Al., 2016; Kohlstedt SG, 2008). Recent research on school gardens has provided many benefits related to biodiversity, including increased food production and nutritional knowledge; increased interest in fruit and vegetable consumption; increased psychosocial attitudes such as a sense of responsibility, increased preferences, dietary behavior, and a willingness to try fruits and vegetables (Langellotto GA, Gupta A, 2012; Ratcliffe MM., et. Al., 2011). Other benefits can also improve students' physical health, improve physiological results, academic achievement in science, mathematics, art, language, reading, writing, positive attitudes towards the environment and give students the opportunity to be more physically active so that more time to move while studying in school gardens and to build connections with other students and the school community. In fact there are already a number of lesson plans and curricula for the teaching of basic mathematics, science, nutrition, health, social science, language, and the arts using school garden features and spaces (Burt, K. G., Koch, P., Contento, I., 2017).

Apart from that, directly benefiting, school gardens also improve well-being, quality of life, and social and cultural cohesion. To generate these benefits, gardens must be integrated into

schools. In general, a greener school yard, is conducive to reducing stress to a positive mood (Burt, K. G., et, al., 2018). Ozer conducted research on the factors that influence the use of parks as an effective educational tool by creating a social ecological model-based framework for the short- and long-term effects of well-integrated school gardens. The three main categories of Ozer are used as the basis of the framework: park locations and activities, the formal curriculum, and parental and community involvement in the park (Ozer EJ., 2007).

Garden can be effectively integrated into schools in a sustainable manner. A well-integrated school garden is described as a tended nearby park, primarily used as a learning environment to create meaningful experiences for students that are a valuable part of the school culture, and are maintained over time. This definition broadens the three main categories of application of Ozer - garden sites, curriculum or learning environments, and communities of parents and others involved with school gardens - by emphasizing the importance of sustainable use over time (Ozer EJ., 2007).

Table 1. Three Domain Categories of Ozer

Garden logistics	Student experience	School culture
Components ï Garden care and upkeep ï Planning and establishing the physical space ï Characteristics of the physical space ï Crop vitality and diversity ï Budget and funding ï Networks and outside organizations	Components ï Connection with curriculum ï Time spent in the garden ï Activities ï Engagement ï Tasting opportunities ï Additional learning opportunities	Components ï Administrative support ï Organizational staff structure ï Volunteer and parent involvement ï Social events and activities ï Food environment and policies ï Evaluation and feedback

Adapted from: The school garden domains created from Ozer's three domain categories and composed of 18 components described in the literature.

The school garden is an excellent means of active learning for a variety of subjects. Science is the subject most closely related to gardens. Many teachers use the school garden as a living laboratory in conducting scientific experiments (Seameo Refcon., 2018). Scientific experiments include experiential learning and hands-on activities as teaching methods to make subject content non-abstract, stimulate students' senses, and increase feelings of meaning (Christensen, J. H., & Wistof, Karen., 2019).

Furthermore, cross-subject collaboration and the learning relationship between indoors and outdoors are central factors in ensuring the effectiveness of teaching the school garden which is integrated with the subjects. Education about biodiversity, food, sustainable nutrition can be carried out through school garden programs during class hours, outside class hours, or during extracurricular activities (Robinson-O'Brien et al., 2009 as cited in Laird, 2016). Education through the school garden program can provide various benefits, including increasing children's knowledge about nutrition, increasing children's preferences for vegetables and fruit, and increasing vegetable and fruit consumption (FAO, 2010; Morris & Zidenberg-Cherr, 2002). In addition, school gardens can provide an active learning atmosphere, thereby strengthening academic, personal, and social skills (Kammar et al., 2017).

Highlighting the importance of school gardens as a promotional medium to increase biodiversity, food and nutrition. School gardens have served a broader educational function, helping children understand science, nature and the environment. There is now broader recognition of the role of school gardens in environmental and nature education, biodiversity and local food conservation, food and ecoliteracy, diet, nutrition and health, and agricultural education.

The school garden is not just a place where students grow vegetables - it is an outdoor learning environment, food and taste, playing a major role in the educational activities that take place there (Kangas et al. 2017; Wistoft 2013). In the school garden students can learn to interact with nature so that they are able to develop an understanding of nature (Bowker and Tearle 2007; Wistoft and Dyg 2017). Gardening can develop students' critical awareness of environmental problems (Ampuero et al. 2015). Students' conceptual world is expanded through school garden programs when they learn to distinguish vegetables in a more capable way (Richards 2010). Their curiosity is high in expressing a desire to get to know new vegetables that have never been grown, harvested or tasted (Ratcliffe et al. 2011). Park research schools show effectiveness in relation to student competencies in the form of skills, knowledge, social competence, personal development and well-being (Kirby 2008; Nyberg 2014; Walter 2012). In other words, the school garden program has many positive effects based on the research outlined above, that school gardens can potentially improve students' skills, knowledge, social competence, personal development and well-being, as well as their critical awareness of environmental issues. School parks do have this potential if they are integrated with subjects.

The school garden has a role as a valuable learning medium. Recent research on school gardens has provided many benefits related to biodiversity, including increased food production and nutritional knowledge; increased interest in fruit and vegetable consumption; increased psychosocial attitudes such as a sense of responsibility, increased preferences, dietary behavior, and a willingness to try fruits and vegetables. Other benefits can also improve students' physical health, improve physiological results, academic achievement in science, mathematics, art, language, reading, writing, positive attitudes towards the environment and give students the opportunity to be more physically active so that more time to move while studying in school gardens and to build connections with other students and the school community. In fact there are already a number of lesson plans and curricula for the teaching of basic mathematics, science, nutrition, health, social science, language, and the arts using school garden features and spaces.

OBJECTIVES

The purpose of this research is to prepare an integrated GREEN (Garden Resources, Education, and Environment Nexus) Model as a learning medium to promote biodiversity and processed foods as well as provide sustainable nutritional content knowledge in schools.

EXPECTED OUTPUT

The existence of the Integrated Model GREEN learning media that is created and developed in schools. The media is expected to promote biodiversity, food, and provide nutritional

knowledge in a sustainable manner through collaborative subjects through Project Based Learning.

BENEFIT AND IMPORTANCE OF RESEARCH

This study aims to acquire novel insights into the formulation and advancement of the GREEN (Garden Resources, Education, and Environment Nexus) Integrated Model within educational institutions, serving as a platform for fostering biodiversity awareness, cultivating processed food, and imparting sustainable nutritional knowledge.

METHODOLOGY

The designed research methodology encompasses several key aspects: research design, setting, sample, data collection techniques, data analysis, and reporting. This study employs an experimental research design, utilizing Project Based Learning, which engages 10th-grade students from both high school and vocational school levels. The research is conducted within the framework of the SIKK (Indonesian School of Kota Kinabalu) Farm extracurricular program. The research employs a variety of tools and materials including manure, fish seeds, fish feed, seedling trays, polybags, vegetable seeds, and other agricultural equipment.

The research took place at the SIKK campus in Sabah, Malaysia. The study focused on a sample size of 34 Grade 10 students, representing disciplines such as Science, Culinary, and Hospitality. The data collection techniques employed various instruments including the Likert Scale questionnaire (Somerset, S., & Markwell, K., 2009), interviews (Lile, J., & Richards, L., 2018), and pretest-posttest (OGDE) (Alexander, R., et al., 2016). The collected data were analyzed using the statistical description method (Hanif, N., Sopandi, W., & Kusrijadi, A., 2013).

RESULT AND DISCUSSION

This research was conducted from March 22 to November 30, 2022, at the SIKK as part of a program aimed at creating an integrated GREEN model. This model serves as a medium to promote biodiversity, food, and nutrition sustainability among grade 10^{th} students in both high school and vocational school. The initial stages of the study involved problem formulation and school garden planning. This began with a comprehensive literature review on school gardens, aligning with the established domains of school gardens set by Ozer. Additionally, content standards for biodiversity, food, and nutrition at the SMA and SMK levels were analyzed to guide the planning process. Following this, the preparation and creation stages of the Integrated GREEN Model were carried out. Preparation involved identifying necessary equipment and materials, including manure, fish seeds, seedling trays, and more. Recycled items and vacant land within the school premises were repurposed. The concept of the Garden Resources, Education, and Environment Nexus (GREEN) integrated three main categories: park location and activities, formal curriculum, and parent and community involvement. The implementation phase featured Project Based Learning, engaging student groups to implement the Integrated GREEN Model program. Teachers, staff, and employees also contributed through a community service program. Seminars targeted parents, school committees, partners, and community

leaders, promoting sustainable biodiversity, food, and nutrition practices.

During the program implementation, experimental activities were initiated, involving the SIKK Farm extracurricular group, Project Based Learning methods, and teacher involvement. The integration of agriculture and fisheries was explored through landscape plantations, polybag planting media, hydroponic systems, and aquaponics. The study evaluated the achievement of main Ozer categories and their components: 1) Garden Logistics: which included garden care, physical space establishment, crop diversity, budgeting, and networks. 2) Student Experience: encompassing curriculum integration, time spent in the garden, activities, engagement, and learning opportunities. 3) School Culture: involving administrative support, staff structure, volunteer participation, events, food policies, and evaluation (Ozer EJ., 2007).

The analysis in this study can be done in two ways, namely qualitative and quantitative analysis. Qualitative data analysis is used to determine the increase in activity in the school garden and the learning process as a form of action that has been taken. While quantitative data analysis is used to determine the increase in student learning outcomes as a result of each action taken. Quantitative data to be analyzed is Pre-Test and Post-Test data. Pre Test is a test that is given before learning begins and aims to find out to what extent students' mastery of knowledge of the learning materials to be taught. Post Test is a test that aims to find out the final differences of students after learning is carried out.

Based on the data from Table 2, it can be seen that the average value of the initial pre-test was 64.85, which increased the average value of the post-test to 76.77, although it was not very significant. This means that the learning carried out by students about biodiversity and nutrition based on the integrated GREEN model results in an increase in student learning outcomes.

Table 2. T-Test: Two-Sample Assuming Equal Variances

	Pre	*Post*
Mean	64.85294118	76.76470588
Variance	755.4019608	276.6702317
Observations	34	34
Pooled Variance	516.0360963	
Hypothesized Mean Difference	0	
df	66	
t Stat	-2.16202408	
P(T<=t) one-tail	0.017123245	
t Critical one-tail	1.668270514	
P(T<=t) two-tail	0.03424649	
t Critical two-tail	1.996564419	

The test results indicate that the t-statistic value is -2.162024078; therefore, it can be concluded that there is statistical significance in the difference between the Pre-Test and Post-Test groups.

Meanwhile, the qualitative data in this study were obtained from the results of interviews and questionnaires. A total of 143 students gave feedback on 10 questions related to the creation of

an integrated model GREEN media. Students' responses to the Likert scale questionnaire can be categorized into three main aspects, namely the motivation and ease of making integrated GREEN media models (items 1 and 2), aspects of knowledge about biodiversity and nutrition (items 4,7,8,10), and activities. and promotion of integrated GREEN Model media for students (items 3, 5, 6, 9).

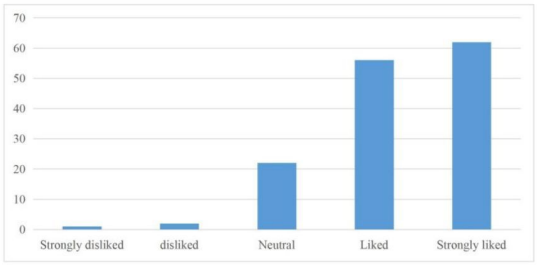

Figure 1

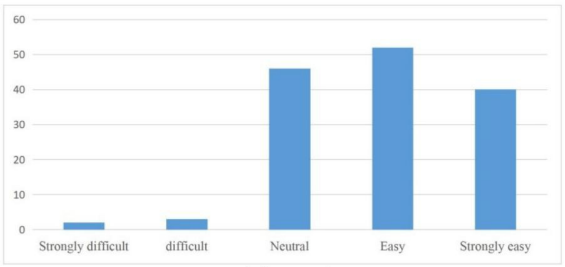

Figure 2

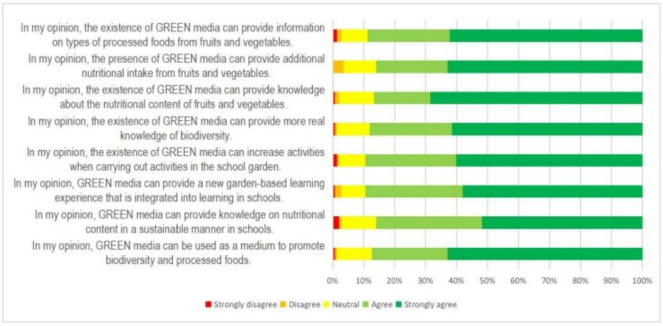

Figure 3

The results of the Likert scale questionnaire feedback can be seen in Figure 1. Motivation about new theory in the creation and development of GREEN Integrated Model on biodiversity, food and nutrition in schools; Figure 2. GREEN Integrated Model creation and development activities on biodiversity, food and nutrition in schools; and Figure 3. Questionnaire Feedback Results on Integrated Model GREEN Media. Student feedback indicates positive motivation and interest in the Integrated GREEN Model, focusing on biodiversity and nutrition in schools (39% liked, 43% expressed interest). Overall, students strongly agreed that the integrated GREEN media model was engaging. Regarding the creation of the model, students found it easy (36%) or very easy (28%). General consensus was that the integrated model was manageable. In terms of knowledge and theory acquisition, students strongly agreed (87.51%) that they gained insights into the creation and development of the GREEN integrated model, as well as practical knowledge of biodiversity and nutritional content in fruits, vegetables, and fish. Concerning activities and promotions, students similarly strongly agreed (87.52%) that the integrated GREEN model effectively promotes biodiversity and processed foods, providing valuable learning experiences in integrated school gardens. Increased engagement and additional nutritional intake from garden produce were also noted. Interview results from three sources support the positive impact of the integrated GREEN program on learning experiences, activities, communication skills, teamwork, and healthy food choices. Moreover, enhanced self-confidence and environmental awareness were evident.

CONCLUSION

The integrated model GREEN media can improve student learning outcomes from an average score of 64.85 to 76.77 in knowledge of biodiversity, food and nutrition. In general, students gave feedback that making the integrated GREEN model was interesting and easy. Most of the

students agreed that the GREEN model was integrated as a medium for promoting biodiversity, food and providing new learning experiences based on school gardens as well as increasing activities. In addition, it can provide nutritional intake of fruits and vegetables.

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