GT HEALIN'G (Gual Tinggi Healing Garden)

Tuan Nur Irdina Zahraa Binti Tuan Rosli

***Abstract* –The GT HEALIN'G Project is an innovative educational initiative designed to promote healthy eating habits and sustainable practices among children through smart farming and experiential learning. In today's fast-paced society, many children show a preference for processed and unhealthy foods, contributing to rising rates of obesity, nutrient deficiencies and poor dietary habits. The project addresses these challenges by introducing an interactive farming system that utilizes recycled materials and integrates smart technologies such as Arduino, sensors and the Internet of Things (IoT). By actively engaging students in the cultivation of vegetables and herbs, GT HEALIN'G fosters a deeper understanding of nutrition, sustainability and food systems. The hands-on experience encourages curiosity, responsibility and positive attitudes toward healthy eating. The project also emphasizes inclusivity and scalability, offering flexible models that can be extended to underserved communities, including low-income families, apartment residents, OKU (persons with disabilities) and aspiring agro-entrepreneurs. This paper presents the conceptual framework, technological setup and pedagogical approach of the GT HEALIN'G system, highlighting its impact on students' knowledge, behaviours and attitudes. Results indicate that children involved in the project are more likely to consume vegetables, demonstrate improved awareness of food sources, and develop healthier lifestyle habits. By combining environmental education, smart technology and community outreach, the GT HEALIN'G Project serves as a replicable model for schools and local organizations seeking to improve youth nutrition and promote sustainable living practices.**

***Keywords*: Smart Farming, Nutrition Education, Arduino, IoT, Healthy Eating**

I. INTRODUCTION

In support of SDG 3: Good Health and Well-Being, it is important to help children build healthy habits from a young age. Today, many children around the world suffer from obesity and poor eating habits. A big reason for this is eating too much fast food and not enough fruits and vegetables. To solve this problem, we need fun and creative ways to teach kids about healthy food. The GT HEALIN'G project is one smart solution. The name stands for Green Technology and Healing through Nutrition and Gardening. This project lets children grow their own vegetables using tools like sensors, mobile apps and automatic watering systems. It turns gardening into a fun, hands-on game that helps children learn about food and nutrition. By growing their own food, kids begin to enjoy eating healthy. They also learn how farming and nature are connected to their well-being. GT HEALIN'G makes learning fun while encouraging better health choices. It helps raise a new generation that cares about their health and the planet.

II. PROBLEM STATEMENT

Many students today are missing out on the essential health benefits of vegetables due to various barriers such as taste aversions, limited exposure at home or school and a growing dependence on fast food and processed meals. These dietary habits have contributed to a worrying rise in health problems among children and adolescents, including obesity, constipation, vitamin and mineral deficiencies and reduced energy levels. These health challenges not only affect students' physical well-being but also have a direct impact on their academic performance, focus and emotional resilience.

Despite widespread awareness about healthy eating, traditional health education often fails to change student behaviour. Simply telling students to "eat more vegetables" is not enough. A more engaging, practical and community-centered approach is needed to shift mindsets and build lifelong healthy habits. GT HEALIN'G promotes a proactive, student-centered strategy to reduce the risk of obesity and lifestyle-related diseases. It fosters a healthier generation through environmental sustainability, life skills development, and early health education. GT HEALIN'G is an innovative, school-based initiative that addresses this challenge by integrating green therapy, aquaponics and health education into the daily lives of students. This hands-on program transforms students into active participants in their own health journey. Students grow their own vegetables such as pegaga (*Centella asiatica*), spinach and tomatoes using eco-friendly methods like aquaponic systems or school gardens. This experience allows them to form a positive, personal connection with vegetables. Through fun and interactive nutrition lessons and simple cooking activities using their harvest, students learn about the value of healthy eating in a practical and memorable way. GT HEALIN'G also extends beyond the classroom. By involving families in gardening programs and organizing school-wide health campaigns, it creates a supportive community that reinforces healthy habits both at school and at home. GT HEALIN'G is more than just a gardening project, it is a transformative approach to health education that empowers students to make better food choices and take ownership of their well-being. Through this program, schools become active agents in the pursuit of SDG 3, nurturing not only healthy bodies but also healthy minds and communities.

III. LITERATURE REVIEW

Numerous studies have shown that traditional classroom-based nutrition education is often insufficient in creating lasting behavioural changes in children (Thomas

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& Harden, 2008; Aijaz, 2025). Children are highly susceptible to the influence of media advertising, peer pressure and the easy availability of junk food, all of which contribute to poor eating habits. Murillo et al. (2016) highlight that integrating experiential learning into the educational framework can significantly increase knowledge retention and behaviour change. School gardens and hands-on farming experiences have shown positive effects on children's willingness to consume more vegetables. However, scalability and sustainability have been challenges for such initiatives. The GT HEALIN'G project builds on this foundation by incorporating Internet of Things (IoT) technology and automation, allowing children to engage in the farming process while learning about environmental stewardship and nutrition in a digital, gamified format. This approach not only increases interest and participation but also aligns with modern educational paradigms that integrate Science, Technology, Engineering, and Mathematics (STEM) learning.

IV. METHOD

The project employed a multi-phase implementation strategy consisting of technological design, experimental application, and educational evaluation. GT HEALING is a smart farming system that combines aquaponics, fertigation, hydroponics, and vertical farming in one greenhouse. These methods help plants grow efficiently by using fish waste, precise irrigation, soil-free cultivation, and space-saving vertical layers. The system is controlled by Arduino and IoT technology, allowing automated monitoring and adjustments. This makes farming easier, increases crop yield, and reduces environmental impact. GT HEALIN'G is a great solution for sustainable agriculture.

Technological Experiment

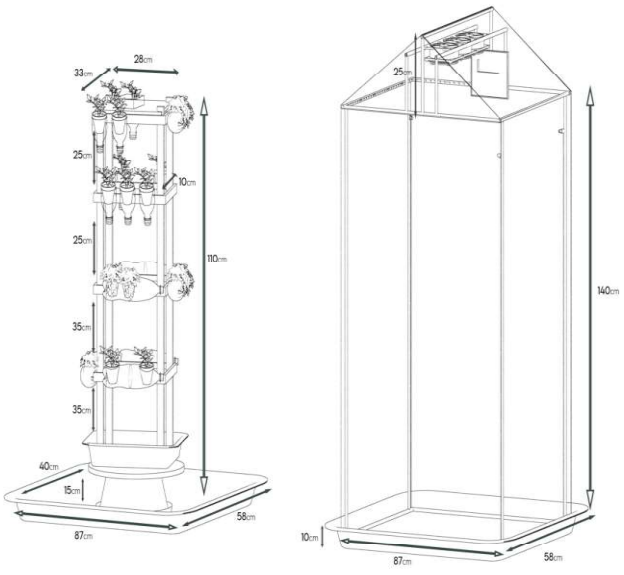

Figure 1: GT HEALIN'G Model

At the heart of GT HEALIN'G is a smart farming unit equipped with:

- Arduino microcontrollers
- Soil moisture sensors
- Humidity and temperature sensors
- Automated water pumps for irrigation
- LED grow lights for optimal plant growth
- Mobile application to monitor plant health and growth progress

The system is designed to be self-regulating with minimal maintenance, making it suitable for classroom or home environments (Refer Figure 1).

Experimental Deployment

The project was piloted in our school with children aged 8–12. Students were grouped and assigned individual smart farming kits, each containing seeds (Pegaga, Water Spinach, Brazilian Spinach, Mint, Stevia), organic soil and compost.

TABLE I: AQUAPONIC: WATER PARAMETERS TO MONITOR

Parameter	Ideal Range	Notes
pH	6.8–7.0 (Ideal)	Acceptable range: 6.4–7.4 for healthy fish, plants, and nitrifying bacteria
Dissolved Oxygen (DO)	>5 mg/L	Catfish or Guppy can tolerate low oxygen but adequate DO is essential for plants and bacteria
Ammonia (NH_3) & Nitrite (NO_2^-)	As close to 0 as possible	High levels are toxic; the system must efficiently convert ammonia to nitrate (NO_3^-) continuously

Table I: Water Parameters to monitor

Educational Modules

Customized educational modules were developed and integrated into the school curriculum, covering:

- Basics of plant biology and agriculture. For example Topic Photosythesis dan Plant Growth.
- Nutritional science.
- Environmental sustainability.
- Digital technology and sensors .RBT Textbook Year 5 and 6.

The learning process was supplemented with interactive mobile apps and games related to farming and healthy eating.

V. FINDINGS

The GT HEALIN'G pilot project showed promising results in both plant cultivation and educational outcomes:

TABLE II: AGRICULTURAL OUTPUT

Plant	Growth Duration	Growing Conditions	Benefits	Notes
Kangkong (Water Spinach)	3–4 weeks	Grows fast, thrives in moist soil	Quick harvest, easy to grow	Ideal for introducing

				kids to farming
Pegaga (Centella asiatica)	8–10 weeks	Continuous harvest possible; likes regular watering	Boosts immunity and brain health, rich in nutrients	Crunchy texture, child-friendly superfood
Brazilian Spinach	Mediu m (6–8 weeks avg.)	Prefers partial shade, needs proper care	High yield with proper maintenance	Excellent for shaded indoor systems
Mint	4–6 weeks	Thrives with controlled irrigation	Aromatic, supports digestion and freshness	Suitable for indoor smart farming
Stevia	6–8 weeks	Needs consistent moisture and light	Natural sweetener, healthy sugar substitute	Performs well under smart system automation

Kangkung, Pegaga and Brazilian Spinach are leafy vegetables suitable for smart farming.

- Kangkung grows quickly and can be harvested within 3 to 4 weeks.
- Pegaga takes longer, around 8 to 10 weeks, but offers continuous harvest.
- Brazilian Spinach thrives in partial shade and produces high yield with proper care.
- Mint and Stevia thrived under controlled irrigation, indicating suitability for indoor smart farming.
- The smart system maintained optimal soil moisture, pH and lighting conditions with minimal human intervention.
- All the herbal plant produced by GT HEALIN'G.
- Crunchy Pegaga is a great choice for boosting children immunity and brain health. It's packed with nutrients that support overall well-being.

VI. DISCUSSION

GT HEALIN'G offers a unique integration of technology and agriculture, tailored specifically to the needs and learning styles of children. By providing a gamified farming experience, the project successfully creates a bridge between education and real-world application. Regarding to research objective whereby to provide an interactive learning platform for science and technology education (e.g., Design and Technology), while serving as a green and functional decoration in classrooms. We found that:

Technological Accessibility

The modular and scalable nature of the Arduino-based system makes it accessible for schools with limited budgets. Additionally, the IoT integration allows real-time monitoring, making the learning process dynamic and data driven.

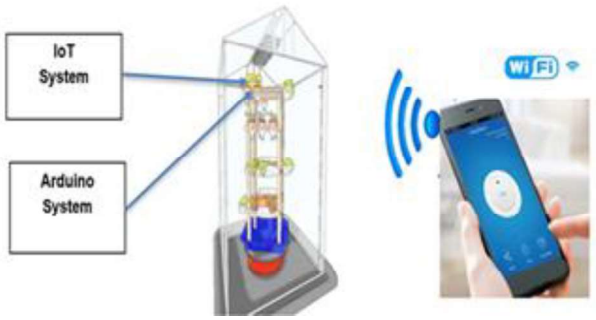

Figure 2: GT HEALIN'G Control System

Behavioural Change

Hands-on interaction with food production fosters a sense of ownership and pride, leading to positive shifts in food choices. Unlike traditional methods that rely heavily on information dissemination, GT HEALIN'G enables experiential learning, which is more effective in changing habits.

Educational Impact

Pre- and post-surveys conducted among participating students revealed:
(Refer Figure 3 and Figure 4)

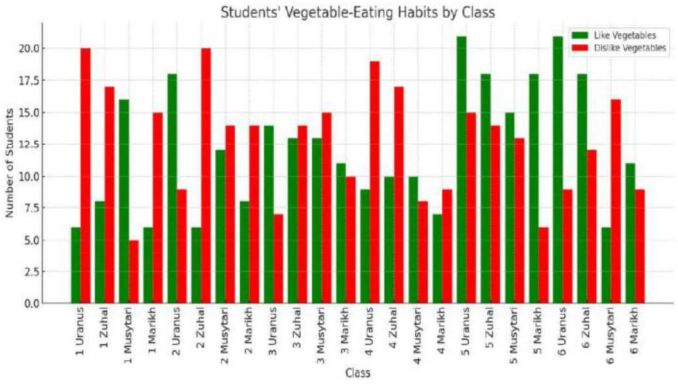

Figure 3: Student's Vegetable Eating Habits by Class

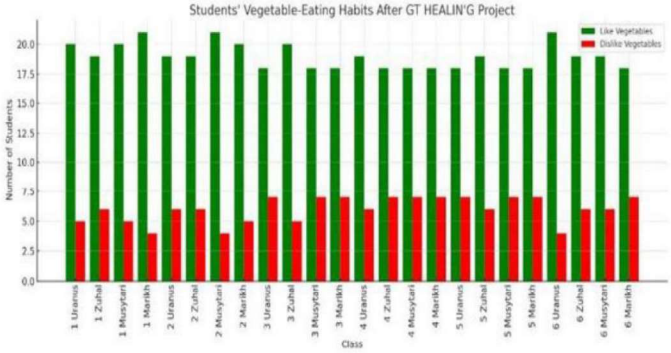

Figure 4: Student's Vegetable Eating Habits After GT HEALIN'G Project

- A 40% increase in knowledge about nutrition and agriculture.

- 60% rise in willingness to eat vegetables grown through the system.
- Improved teamwork, responsibility and curiosity in scientific learning.

Teachers reported greater student engagement and parents noted increased interest in healthy food at home.

VII. CONCLUSION (OR LIMITATION OR SUGGESTION FOR FURTHER STUDIES)

Future Integration

The project opens up possibilities for further integration with AI-driven analysis, gamification for behaviour tracking and expanded agricultural modules covering composting, pollination, and climate change education.

GT HEALIN'G can help solve the issue of vegetable intake among students and this project has the potential to be expanded nationwide, similar to the School Milk Programme (Program Susu Sekolah). It can be a part of the government supplemental food aid programme for student and we can name it Green Bites Programme.

This project can be implemented comercially and more effectively with support and guidance from UMK, PPK, MARDI, Agriculture Department, Utility Automation Sdn. Bhd. and other relevant parties.

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Figure 5: GT HEALIN'G MyIPO CERTIFICATE

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