

Addressing The Crisis of Food Insecurity Through Urban Farming Among Students in School: A Systematic Literature Review (SLR)

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To Link this Article: <http://dx.doi.org/10.6007/IJARPED/v13-i3/21470>

DOI:10.6007/IJARPED/v13-i3/21470

Published Online: 22 May 2024

Abstract

Urban farming activities are relatively less known among school students. Food security is a pressing issue as the world faces a food scarcity crisis. This study is crucial because it tackles immediate and long-term food insecurity, enhances education, promotes healthy eating habits, supports environmental sustainability, fosters community building, and offers economic and psychological benefits. This study aims to identify appropriate learning approaches and strategies to expose school students to urban farming to address food security challenges. Using SCOPUS and Web of Science (WOS) databases, the study employed the PRISMA model, selecting eighteen relevant articles to answer the research questions. Findings indicate that project-based learning, inquiry-based learning, and hands-on activities using hydroponics or aquaponic kits integrated with strategies like school gardens, field trips, pilot projects, and farm-to-school programs can significantly enhance students' understanding of urban farming and its role in addressing food security issues. A conceptual framework was developed based on these approaches and strategies. Further research is necessary to investigate additional learning methods and suitable strategies to refine and enhance this framework, ensuring the effectiveness of urban farming education programs in schools and making them more comprehensive and impactful in addressing food security challenges.

Keywords: Urban Farming, Urban Agricultural, Learning Methods, Learning Strategies, Food Insecurity

Introduction

One of the basic needs of humanity is food, and without food, humans cannot sustain life because it is through food that humans are supplied with the energy and nutrients required by the human body. The issue of food crisis is currently a heated topic of discussion, not only in Malaysia but globally as well. Food crises can occur due to a shortage of available food supplies. What is more concerning is that the global food crisis now involves staple food supplies such as rice, wheat, grains, and maize, which are essential for every individual worldwide. Corinne Fleischer, the Director of the World Food Programme (WFP) for West Asia, has mentioned that some countries are experiencing food inflation rates of over 60

percent. According to the Department of Agriculture and Environment Statistics, the COVID-19 pandemic has presented significant challenges to the global food supply chain. Border closures by countries as a preventive measure for COVID-19 have disrupted the flow of raw materials and finished goods. The impact of this pandemic has affected all processes linking production from farms to end consumers. The agricultural sector must be protected to ensure that the population has an adequate food supply and to safeguard the well-being of low-income groups (Izzati et al., 2022).

In addressing food security in our country, promoting urban farming is a wise step. Urban farming has gained popularity among city dwellers since the onset of the COVID-19 pandemic in early 2020. It is estimated that 60 to 85 percent of the world's population will be considered urban residents. The rapid urbanization process is expected to exacerbate poverty and food insecurity in cities, as urban residents are the primary food consumers who rely on cash income to access food. Food production is traditionally associated with rural areas, and urban residents are often assumed to be sufficiently reliant on rural food production. However, urban farming can meet the food demand of urban residents if practiced appropriately. The Food and Agriculture Organization (FAO) defines urban farming as agricultural activities involving planting, raising, processing, and distributing agricultural products without taking into account land size and the number of human resources in urban areas.

Studies in 15 countries have shown that urban farming is closely related to food security, dietary diversity, and adequate nutrition. Urban farming activities can contribute to the availability of fresh and nutritious food, direct access to various types of food products, and the reduction of food bills. Urban farming can also make urban areas greener and help improve the urban climate, while encouraging the reuse of organic waste. The Malaysian government has shown full support for urban farming. This is evident from the establishment of the urban farming division under the Malaysian Department of Agriculture in 2010 to promote urban farming activities, aimed at reducing the cost of living for urban communities. According to the Melaka State Department of Agriculture, the Urban Farming Program is designed to assist urban households in reducing their cost of living by producing some of the food they need under the guidance of the Department of Agriculture. Among its objectives are to support the government's efforts in ensuring the quality and food security of the nation and to foster awareness and interest in the importance of agriculture as a direct contributor to the well-being and environmental happiness of urban communities.

Research Problem

The issue of food security is becoming increasingly prominent today. This issue demands the best approaches for addressing it. It is widely discussed both globally and within the country. Awareness of food security and urban agriculture should begin from the school benches. When students are aware of food security issues and the importance of urban agriculture, they can learn how to engage in urban farming, especially in the metropolitan city of Kuala Lumpur, and understand its significance. However, today's Science curriculum primarily focuses on classroom and laboratory teaching and learning. Students are less exposed to the food security crisis and have limited interaction with their surroundings to explore urban farming. Most students are unaware of the food security crisis and how to address it. They also lack knowledge of suitable techniques and methods for urban farming. Therefore, an effective approach must be implemented by educators to raise awareness among students

about the importance of urban agriculture, thereby shaping a generation that is critical in addressing the challenges of this food security crisis.

Based on the issue described, the purpose of the research is to summarize, identify and analyze how to address the crisis of food insecurity through urban farming among students in school.

The research questions are:

1. What are the types of approaches that can integrate urban farming into the existing curriculum to enhance students' hands-on learning experiences?
2. What best practices can be identified from existing school programs that successfully enhance students' awareness of food security?
3. What are the impacts of urban agriculture education, particularly on students, in addressing food security issues?

Methodology

This section explains the method used to analyze the suitable article to identify research on the learning approaches for exposing students to addressing food security crises through urban farming, three search engines in the database were utilized to search for articles and journals, namely SCOPUS, Science Direct, and ERIC. There are four main subsections, namely Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA); the resources used in this study; the systematic review process utilised to select the articles including identification, screening, and eligibility; as well as the processes of data abstraction and analysis which led to the findings of the current research.

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)

The authors need guidance in sourcing standard publications that contain the relevant and necessary information for the purpose of their research. PRISMA can be used as a basis for reporting systematic reviews for all types of research. PRISMA acts as catalyst to help authors produce further evidence that can be considered when, in the future, they perform further reviews of their checklist for the inclusion of publications in research.

A Systematic Literature Review (SLR), also known as Systematic Literature Review, is a study that requires the formulation of clear research questions using systematic and explicit methods to identify, select, assess, collect, and analyse data from relevant previous studies (Moher et al 2009). The PRISMA flowchart for article selection encompasses four stages: identification, screening, eligibility, and inclusion in the SLR study (Liberati et al., 2009).

Resources

Two leading databases, namely SCOPUS and Web of Science (WOS), were employed in the article search for the conducted Systematic Literature Review (SLR). Keywords such as "Urban Farming Education," "Food Security," "Hydroponic," and "Aquaponic" were used in the article search in English. These keywords were chosen to retrieve articles related to urban farming education and food security crises. Based on these keywords, the articles retrieved from the databases were related to the learning processes involving urban agriculture and the importance of addressing global food security crises.

Systematic Review Process for Selecting the Articles

The review was conducted in December 2023. The systematic review process consisted of three stages, namely identification, screening, and eligibility.

Identification

The first stage in the systematic review process was the identification of keywords (Table 1), followed by a process of searching for related and similar keywords based on thesauri, dictionaries, encyclopaedias and past research. The keywords have been validated by experts on the topics of urban farming, school students, and food security. The "*" marks enable the keywords to be found in the related articles whether the keyword is in the form of singular or plural. The articles found from the Scopus database totalled 50, & Web of Science 542 articles. Hence, the accumulated number of articles generated from the resources was 592 articles in the first stage of the systematic review process.

Table 1

Database	Keywords
Scopus	TITLE-ABS-KEY (urban AND farming AND among AND school AND students) TITLE-ABS-KEY (food AND security AND knowledge AND among AND students) AND (LIMIT-TO (DOCTYPE , "ar"))
Web of Science (WOS)	TS=((urban farming* OR urban agricultural* OR urban garden*) AND (garden in school* OR school farm* OR food insecurity* OR food security*))

Screening

Before the screening process began, a total of were removed as these papers appeared in all pf the three databases. In the first stage of screening, the remaining articles were screened based on several inclusion and exclusion criteria.

The first criterion was accessibility, where the researcher decided to focus on articles with open access. This meant the articles with all available types of open access were accepted. The second criterion considered was document type. Research articles were the type of document that the researcher was focused on. This was influenced by the need for primary sources that offered empirical data. Thus the papers that did not offer empirical data were excluded. The third criterion was language. Only publications in the English languages were chosen by the researcher. The fourth criterion was that the publication date of the articles needed to be within the period of the last 6 years. The information related to these criteria of inclusion and exclusion is presented in Table 2.

Table 2

Criteria	Inclusion	Exclusion
Publication Time	2017- 2023	2016 and before
Document Type	Article	Proceeding
Language	English	Other than English Language
Nature of Study	Related to Urban farming and food security	Not related to urban farming and food security

Eligibility

After papers were screened out in the previous stage, the third stage in the systematic review process was eligibility. A total of 116 articles underwent this stage. At this stage, the title, abstract and main contents of the remaining articles were thoroughly reviewed to ensure the appropriateness of the stated criteria in achieving the objectives of the current research study. Ultimately, a total of 101 articles were excluded because they were not based on empirical data and were considered articles that did not answer the research question on students' knowledge about urban farming that influences food security. Therefore, the remaining 18 articles were selected for this study

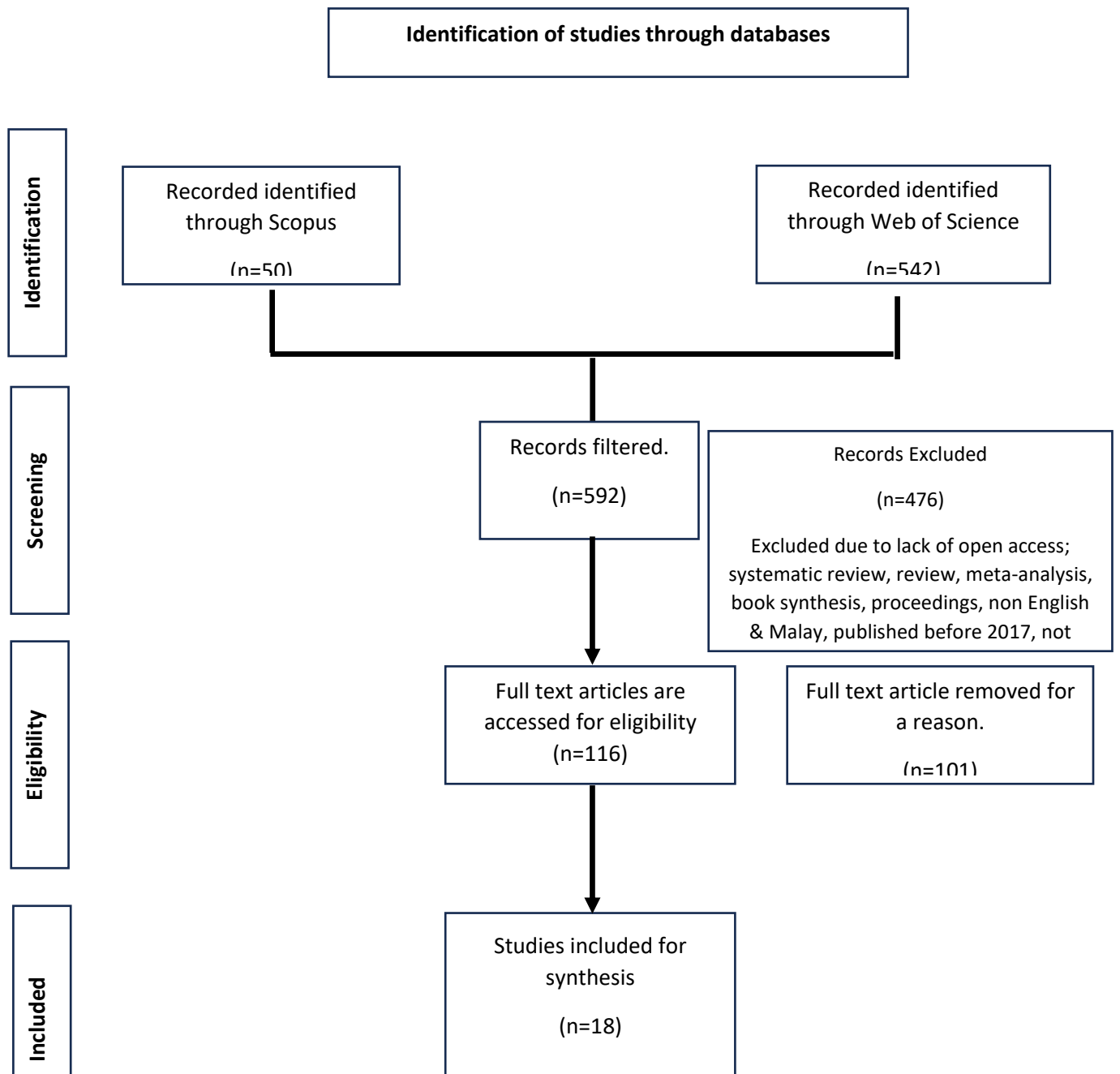


Figure 1: Flow chart for systematic review
 (Source: Adapted from the PRISMA flowchart (A. Liberati 2009))

Table 3

Num.	Authors	Research Title
1	Rushi Wang and Shigeto Yanai (2023)	Characteristics and Roles of School Gardens in Urban Areas of Japan: Perspective of School Managers
2	Vicente et al. (2022)	Urban vegetable gardens and composting as tools for primary schools students understanding of the EU Green Deal
3	Shaharuddin, W.Y.W., et al. (2022)	Students' Knowledge in Science: An Evaluation via Hydroponic Kit
4	Smathers C. A. and McDermott T. S. (2022)	Addressing urban food security through agriculture career awareness
5	Yan Zhou et al. (2022)	How Does Urban Farming Benefit Participants? Two Case Studies of the Garden City Initiative in Taipei
6	Priyanti et al. (2021)	The role of agroedu-tourism program in enhancing young generation's knowledge on urban farming: Hydroponics technique
7	Hartson et al. (2021)	Testing the Effects of Two Field-to-Fork Programs on the Nutritional Outcomes of Elementary School Students From Diverse and Lower-Income Communities
8	Kwok SWH et al. (2021)	Effects of the School-Based Integrated Health Promotion Program With Hydroponic Planting on Green Space Use and Satisfaction, Dietary Habits, and Mental Health in Early Adolescent Students: A Feasibility Quasi-Experiment
9	Arezoo Amiri et al. (2021)	Potential effects of school garden on students' knowledge, attitude and experience: A pilot project on sixth-grade students in Iran
10	Holmes et al. (2020)	"Sow, Grow, Know, and Show": The Impact of School Gardens on Student Self-Perception in the Mississippi Delta
11	Hartadiyati, et al. (2020)	The compost tea on hydroponics system used to increase understanding of Sustainable Development for high school students in Adiwiyata program
12	Caroline B. Rains et al. (2019)	Farm-to-school education grants reach low-income children and encourage them to learn about fruits and vegetables
13	Amy L. Best and Katie Kerstetter (2019)	Connecting Learning and Play in Farm-to-School Programs: Children's Culture, Local School Context and Nested Inequalities
14	Mikkelsen and Bosire (2019)	Food, Sustainability, and Science Literacy in One Package? Opportunities and Challenges in Using Aquaponics Among Young People at School, a Danish Perspective
15	Fifolt & Morgan (2019)	Engaging K-8 Students through Inquiry-based Learning and School Farms

16	A-Young Lee et al. (2018)	Elementary School Students' Needs and Preferences Regarding Urban Agriculture
17	Powell and Wittman (2018)	Farm to school in British Columbia: mobilizing food literacy for food sovereignty
18	Fifolt et al. (2017)	Promoting School Connectedness Among Minority Youth Through Experience-Based Urban Farming

Data Abstraction and Analysis

An integrative review was used in this study. This review analysed and synthesized various research designs together, including qualitative; quantitative; and mixed methods. Next, based on the thematic analysis, the processes of developing the appropriate themes and sub-themes were performed. Firstly, the data was compiled. This was done by carefully analyzing the 18 selected articles to extract statements or data that answered the research questions. Next, the authors converted the raw data into usable data with the determination of themes, concepts, or ideas for the relevant data through coding methods.

Results

Based on the results from the analysis of the selected article there were 3 main regions involved in the research of urban farming.

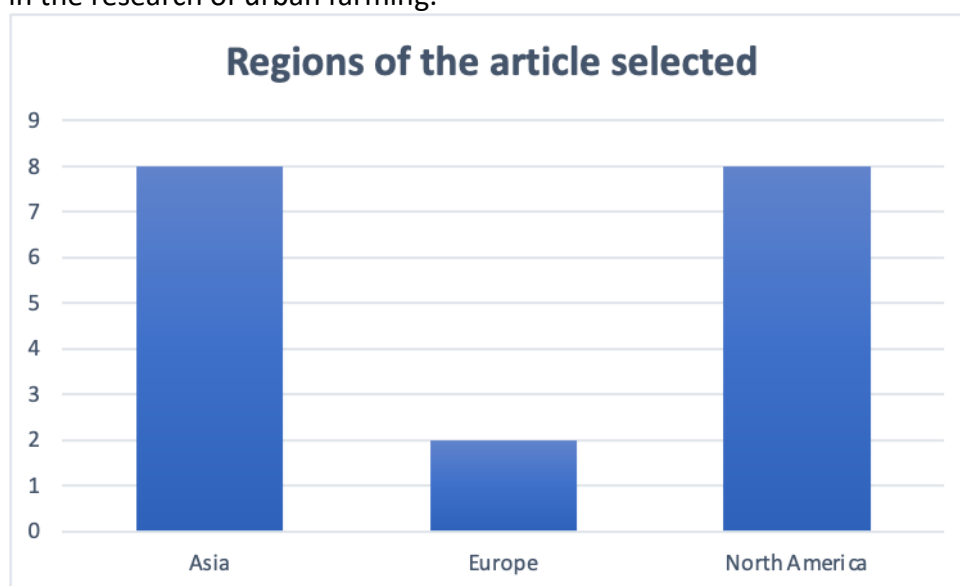


Figure 2: Regions where the studies were conducted.

More specifically 8 studies were in Asia, 2 studies were in Europe, and 8 other studies were from North America.

In the present systematic review, an analysis of the experimental designs of these studies showed that 7 articles used quantitative designs, 8 used qualitative designs, and 3 used mixed methods designs.

The results showed that most of the studies used qualitative designs and quantitative design. Only three studies used the mixed methods designs. The sample sizes for the questionnaires were diverse, from 46 respondents up to 1268 respondents. Next, amongst the studies using

interviews, the smallest recorded sample size was only three respondents, while the biggest recorded sample size was more than 200 respondents for focus group interviews. The list of sample sizes for all designs and instruments involved is summarised in Table 3.

Table 4

Summary of Country, Experimental Design, Instrument and Sample Size of 18 Selected Articles

Authors (Year)	Region: Country	Experimental Design	Instrument	Sample
Rushi Wang and Shigeto Yanai (2023)	Asia: Japan	Quantitative	Questionnaire	361
Mariana Marques Vicente et al (2022)	Europe: Portugal	Qualitative	Pilot Project	104
Shaharuddin, W.Y.W., et al. (2022)	Asia: Malaysia	Quantitative	Pre-Post Test	70
Smathers C. A. and McDermott T. S. (2022)	North America: USA	Qualitative	Interview	25
Yan Zhou, Chunjui Wei and Yong Zho (2022)	Asia: Taiwan	Qualitative	Observation, Interview, participatory design, and participatory action	17 for interview
Priyanti et al (2021)	Asia: Indonesia	Quantitative	Questionnaire	46
Hartson et al. (2021)	North America: USA	Quantitative	Questionnaire	264+56
Kwok SWH et al. (2021)	Asia: China	Quantitative	Quasi-Experiment & Questionnaire	553
Arezoo Amiri, et al. (2021)	Asia: Iran	Mixed Methods	Pre-Post Test & Interview	110
Holmes, E.A., et al. (2020)	North America: USA	Mixed Methods	Test & interview	Garden Knowledge = 221 Consumption pattern & food security = 252
Hartadiyati, Wiyanto, Rusilowati, A., (2020)	Asia: Indonesia	Quantitative	Pre-Post Test	15
Caroline B. Rains, Kristen C. Giombi and Anupama Joshi (2019)	North America: USA	Mixed Method	Document analysis, Semi-structured interviews	
Amy L. Best and Katie Kerstetter (2019)	North America: USA	Qualitative	Observation & ethnographic data	292

Egberg Mikkelsen, B., and Momanyi Bosire, C. (2019)	Europe: Denmark	Qualitative	Interview	3
Matthew Fifolt & Amy F. Morgan (2019)	North America: USA	Qualitative	Semi-structured interviews	5 principles of Partners School
A-Young Lee, et al. (2018)	Asia: South Korea	Quantitative	Questionnaire	1268
Lisa Jordan Powell and Hannah Wittman (2018)	North America: USA & Canada	Qualitative	Document analysis	Document analysis of BC farm-to-school movement
Fifolt, et al. (2017)	North America: USA	Qualitative	Semi-structured focus group interviews	33 students + 25 parents

Based on the findings of this study regarding the year of publication of these articles, eleven articles were published from 2020 to 2023. Four articles were published in 2019, two published in 2018, and one article published in 2017.

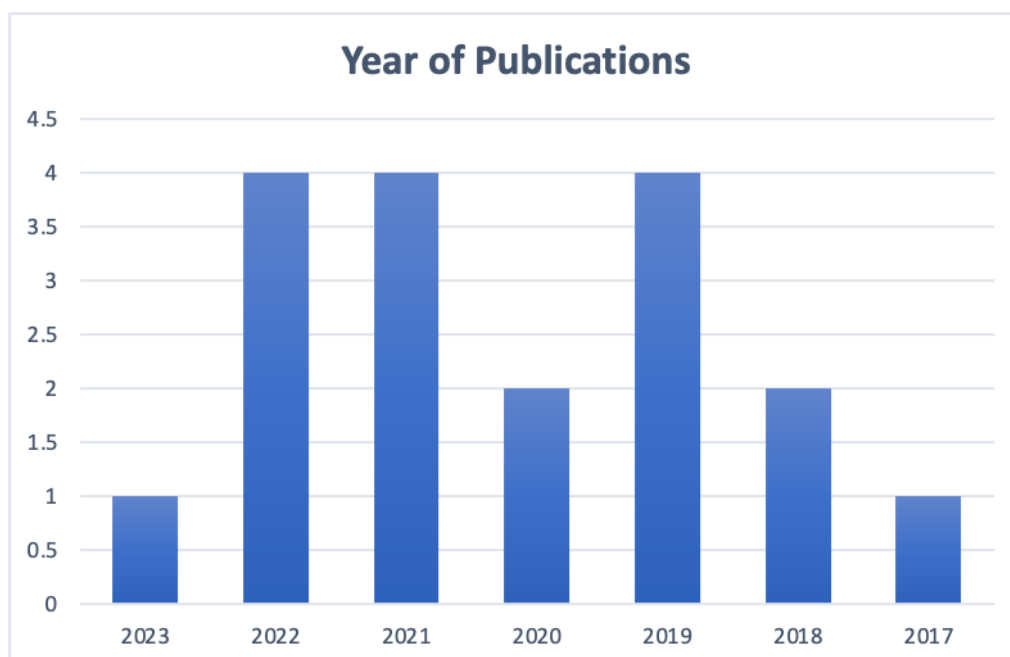


Figure 3: Year of Publication.

Table 5
Findings From Articles

Authors	Year	Teaching & Learning Approach			Strategies			
		Project Based Learning/Inquiry Based Learning	Hydroponic	Aquaponic	School Garden	Farm to School	Field Trips	Field Trips
Rushi Wang and Shigeto Yanai	2023				X			

Mariana Marques Vicente et al	2022			X			X
Shaharuddin, W.Y.W., et al.	2022	X	X				
Smathers C. A. and McDermott T. S.	2022			X			
Yan Zhou, Chunhui Wei and Yong Zho	2022	X		X			
Priyanti et al	2021	X	X				X
Hartson et al	2021					X	
Kwok SWH et al	2021	X	X				
Arezoo Amiri, et al	2021			X			
Holmes, E.A., et al	2020			X			
Hartadiyati, Wiyanto, Rusilowati, A.,	2020	X	X				
Amy L. Best and Katie Kerstetter	2019					X	X
Egberg Mikkelsen, B., and Momanyi Bosire, C.	2019	X		X			
Caroline B. Rains, Kristen C. Giombi and Anupama Joshi	2019					X	X X
Matthew Fifolt & Amy F. Morgan	2019	X					
A-Young Lee, et al	2018	X		X			
Lisa Jordan Powell and Hannah Wittman	2018					X	
Fifolt, et al	2017	X					

Findings & Discussion of The Study

The primary objective of this Systematic Literature Review (SLR) study was to identify learning approaches for exposing students to the importance of urban agriculture. The study also aimed to identify the impact of urban agriculture education on students in addressing food security issues. Additionally, the research was conducted to develop a conceptual framework based on approaches that can be integrated with urban agriculture and strategies for providing exposure to students to address food security crises. Following the examination of research articles, 18 articles meeting the established criteria were identified.

Urban farming is not widely recognized in large cities due to the geographical constraints and population density that limit suitable areas for cultivation. Urban farming has now become a viable option for urban residents in major cities like Kuala Lumpur. In a study by Ishak et al (2022), numerous benefits of gardening activities, particularly urban farming, in addressing food security were highlighted. According to the National Security Council (2022), urban farming is an initiative to reduce the cost of living while enjoying the benefits of healthy and fresh produce. Furthermore, urban farming programs are easy to implement, and the yields can be obtained within a short period. The adoption of urban farming should commence at an early stage, ideally at the school level. To implement and succeed in urban farming, teachers, parents, and students all play significant roles to ensure that urban farming becomes a common practice.

What are the types of approaches that can integrate urban farming into the existing curriculum to enhance students' hands-on learning experiences?

Project-Based, Inquiry based-learning & Hands-on Learning using Hydroponic/Aquaponic Kit.

An appropriate learning approach to educate students about the significance of urban farming in addressing food security is Project-Based Learning (PBL). According to a study by Wan Yusoff et al (2022), the project-based learning method using hydroponic kits can enhance students' knowledge and understanding of science, technology, engineering, and mathematics (STEM). According to the study, employing a project-based learning approach within STEM education, particularly with the utilization of a hydroponic kit, can enhance both the understanding and enthusiasm for science among school students. Analysis of pre-test and post-test questionnaire scores revealed advancements in overall knowledge, comprehension of the pros and cons of hydroponic systems, and practical application knowledge. The study by Fifolt et al (2017), School-based urban farms fostered school connectedness by promoting positive relationships, enhancing students' social-emotional growth, and providing hands-on, experience-based learning opportunities. Students experienced significant benefits from constructive interactions with their peers and mentors, who acted as guides and inspirational figures. In another research by Fifolt and Morgan (2019), educators employed inquiry-based approaches to involve students in dynamic, experiential learning, nurturing their sense of empowerment and accountability. Therefore, students exhibited heightened enthusiasm for experimenting with different foods, opting for healthier options and impacting their parents' culinary practices as a result of their farm engagements. The farm initiative aided students in establishing a feeling of stability and belonging within the school environment, potentially facilitating their transition to advanced grades. The study from Hartadiyati et al (2020) shows a significant increase in students' understanding of sustainable development when using hydroponics system in learning. In the initial study by Mikkelsen & Bosire (2019), it was discovered that integrating modern

technology into teaching methods could positively impact transformative processes within schools. However, successful and sustainable implementation necessitates careful practical and theoretical deliberation. Users highlighted various benefits, such as its versatility across subjects like biology, mathematics, and science. The findings suggest that affordable aquaponics setups hold significant promise for enhancing elementary school education. Additionally, initial results from the study indicate that incorporating user-friendly intelligent sensors and devices into the system presents an opportunity to teach about food, sustainability, and fundamental principles of managing biological systems in a comprehensive manner. Integrating PBL by conducting aquaponics and aquaculture projects can nurture students' attitudes toward STEM education and effectively engage their interest in STEM-related disciplines and careers.

What best practices or strategies of exposure to students that successfully enhance students' awareness of food security?

Urban farming is gaining recognition and being implemented in schools. Some schools participate in competitions that involve students in developing suitable urban farming methods. To introduce and enhance students' knowledge of urban farming, several strategies are employed. According to Priyanti et al (2021), strategies used to improve students' knowledge of hydroponics include traditional classroom learning, practical classes, and field trips as part of agro-educational tourism programs. Additionally, the implementation of pilot projects involving the establishment of outdoor model areas focusing on urban vegetable cultivation and composting serves as an environmental education tool to engage students in schools (Vicente et al., 2022). The use of urban vegetable garden projects has proven to be an effective environmental education tool involving both elementary students and teachers, fostering an appreciation for the environment among them. The implementation of such pioneering projects helps introduce students to the importance of urban farming in producing fresh, edible crops while obtaining essential nutrients without the need to import produce from elsewhere. Students will have the opportunity to taste the fruits of their labor, fostering a greater appreciation for their own produce. A research by Amiri et al (2020) indicates that school gardens have the potential to spark curiosity and cultivate an interest in urban farming among students, nurturing a stronger bond with the environment and food origins. School garden programs in Iran hold promise for advancing urban education, achieving educational objectives, and motivating students to participate in agricultural pursuits. Whereas findings from the study by Wang and Yanai (2023) revealed that the placement of school gardens impacts their attributes; internal school gardens prioritize safety but lack community integration, whereas external school farms offer richer agricultural opportunities for students. A significant number of elementary schools in urban regions of Japan incorporate school farms, underscoring the importance of comprehending factors that shape administrators' assessments of school gardens for future enhancement. Three distinct categories of school gardens emerged: exclusive school gardens, combined school gardens and farms, and standalone school farms, each presenting unique features and contributing to students' agricultural learning experiences. School gardens can be utilized as project sites for urban farming, such as hydroponics or aquaponics, while also attracting students to actively participate in these projects. Furthermore, according to Emily A. Holmes et al (2020), school garden projects can improve leadership skills, problem-solving abilities, and students' self-potential. On the other hand, farm-to-school program has promoted food literacy to foster broader public involvement in addressing social justice and equity within food systems

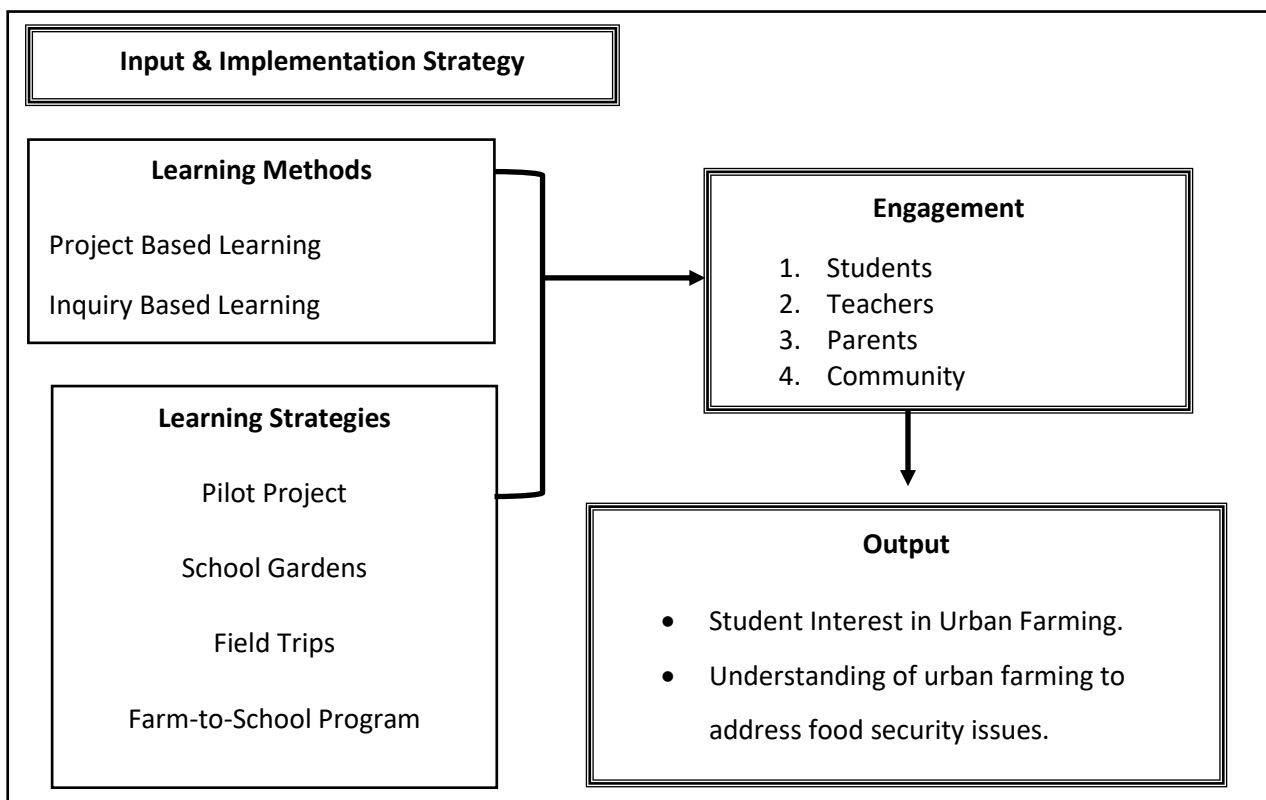
(Powell and Wittman, 2018). The study underscores the significance of school gardens in bolstering connections between schools and communities, enhancing food literacy, and offering practical, hands-on learning experiences for students. Farm-to-school initiatives in specific areas of British Columbia have effectively tackled issues related to food insecurity, imparted knowledge about food systems to students, and heightened environmental consciousness through tangible actions such as establishing school gardens and greenhouses. Education stands as a foundational pillar in the success of farm-to-school initiatives, facilitating the necessary behavioral shifts among youth to enhance acceptance of school meals, promote better health outcomes, and bolster food security (Rains et al., 2019). According to Hartson et al (2021) initiatives such as the Field-to-Fork Multi-visit Program and the Field-to-Fork After-school Club within farm-to-school programs enhanced elementary school students' understanding of cooking vegetable-based recipes and their consumption of vegetables. These programs targeted students from varied urban backgrounds, including lower-income communities. However, the study did not observe a notable improvement in the awareness of daily fruit and vegetable intake guidelines. This outcome could be attributed to the emphasis on experiential learning rather than rote memorization. Educators involved in farm-to-school initiatives fostered nutrition education among students by establishing a student-centered learning atmosphere that merges educational elements with playful activities. Students from environments with ample resources were found to be more adept at utilizing this educational setting (Best and Kerstetter, 2020). According to the study, children who had prior experiences blending play with learning, and who had access to institutional resources like school garden programs, were more ready to benefit from learning opportunities during farm field trips and Mobile Markets. Farm-to-school programs could improve by explicitly acknowledging the diverse cultural and institutional resources available to different student populations when designing and executing activities.

What are the impacts of urban farming education, particularly on students, in addressing food security issues?

In Seoul, South Korea, elementary school students exhibited significant engagement with urban agriculture activities, demonstrating both keen awareness of their importance and a strong desire to participate in such programs (A-Young Lee et al., 2018). The majority of children expressed a preference for urban farming activities lasting between 30 to 60 minutes, indicating a preference for shorter-term engagements. Utilizing these insights can enhance the effectiveness and satisfaction of children's participation in urban agriculture by implementing regular and ongoing activities. School gardens have the most significant impact in creating a safe environment for exploration, self-awareness, cooperation, and growth through which students develop the skills they need to make a difference in their communities. A study by Fifolt et al (2017) indicates that students and parents become interested in urban farming after participating in related studies. Students and parents also start discussing various fruits and vegetables they have attempted to grow through the Schoolyard Garden (JVTF) activities. According to Yusof et al (2022), hydroponic kits help assess students' knowledge and interest in STEM education. Based on the conducted studies, it is evident that strategies employing school gardens significantly enhance awareness among students about urban farming and its importance in addressing the current global food security crisis. Urban farming can serve as a means to address risks related to food safety and security, contributing to sustainable development goals by leveraging its multifaceted roles (Steenkamp et al., 2022). Furthermore, urban farming can also address other urban risks such

as unemployment and social decline. Steenkamp's study encourages food safety and mapping departments to promote more sustainable food supply chains and establish land use and zoning specifically for urban farming. Yan Zhou et al (2023) agree that urban farming effectively address food supply and healthy aging for an aging urban society to some extent.

The findings from past research articles demonstrate that project-based learning and inquiry-based learning approaches, hands-on activities, as well as strategies involving school gardens, field trips, agroedu-tourism, and pilot projects, are highly effective in imparting impactful urban farming education, especially to students in addressing food security issues. The implementation of the school-based hydroponic planting integrated with health promotion activities resulted in a beneficial influence, enhancing health-related knowledge, attitudes, and behaviours among elementary students (Kwok et al., 2021).



Teaching and Learning related to urban farming. However, there is still a scarcity of research conducted specifically on the impact of project-based learning on urban farming education, especially for school students, in addressing food security issues. Furthermore, various effective teaching strategies have been examined, including school gardens, farm-to-school program, field trips including agro-educational tourism, and pilot projects. Based on these studies, it is evident that students are motivated to engage in urban farming activities once they understand its significance in addressing food security. Through project-based learning and hands-on activities, students, parents, teachers and community gain meaningful and positive experiences while producing fresh and highly nutritious crops for their families.

Conclusion

This SLR study was conducted using two databases: SCOPUS, and Web of Science. The collected articles were evaluated for their relevance to the research question at hand. The study concludes that the teaching approaches and learning strategies for exposing students

to urban farming and its significance in addressing food security are closely intertwined and have a significant impact on students in addressing this issue. Project-based learning, inquiry-based learning, and hands-on activities, particularly with the aid of hydroponic or aquaponic kits, play a significant role in introducing urban students to a practical and accessible farming method, especially in densely populated areas with limited agricultural land for development. Learning practices or strategies involving school gardens, field trips, farm-to-school programs, and pilot projects also pique students' interest and enthusiasm for delving into urban farming. These activities can be extended to involve more students in making urban farming a well-known practice. Involvement from students, teachers, parents and the community is crucial for the success of urban farming initiatives. Raising awareness from various sources is highly encouraged to emphasize the global issue of food security. There are limitations in finding sources related to urban farming education as there is still a lack of research aimed at identifying suitable teaching and learning approaches and strategies for introducing urban farming to students in schools and its significance in addressing the ongoing global food security issue.

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