The Importance of Agricultural Knowledge in Early Childhood Education: A Scoping Review

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Abstract
Indonesia is an agrarian country and has potential in agriculture that is not in line with the potential of supporting human resources. Therefore, it is necessary to introduce agriculture from an early age. Early childhood learning programs with an agricultural perspective can equip children with knowledge about the importance of agriculture as well as basic skills such as caring for, watering and planting plants. This research aims to understand the importance of agriculture-based learning in early childhood education environments. This research method uses Preferred Reporting Items for Systematic Review and Meta-Analyses for scoping reviews using 3 databases namely science direct, google Scholar, and sage journals. The literature reviewed from the scoping review obtained 8 articles that fulfilled the use of qualitative and quantitative or mixed methods. Types of journals produced are mostly children's education journals, environmental education journals for children, and journals about nutrition for children. Many research subjects also center on children's intelligence, scientific and nature-friendly attitudes, cognitive, language, and social skills that children can acquire from gardening or agriculture-based learning. From data collection and preparation of literature material, benefits from agriculture-based learning programs are obtained. This benefit is the basis for the importance of agriculture-based learning in kindergarten children. The benefits of agricultural learning-based activities in Early Childhood Education (ECE) include increasing early childhood knowledge and love for agricultural activities, increasing children's naturalistic intelligence, promoting healthy food in early childhood, environmentally friendly attitudes, and cognitive intelligence.

Introduction
Indonesia is an agricultural country, which means that Indonesia has abundant natural wealth and many Indonesians work in the agricultural sector. From a geographical perspective, Indonesia is located in a region that has high rainfall and is a tropical area with even sunlight intensity, thus producing various kinds of agricultural commodities such as palm oil, rubber, cocoa, etc. The Center for Research and Development of Land Resources in 2016 showed that 15.9 million ha of land in Indonesia has the potential for agricultural areas (BBSDLP, 2017).

The vast amount of agricultural land in Indonesia has enormous potential to support the national economy. The high agricultural potential in Indonesia requires human resources who are capable and professional in the agricultural sector. Agricultural knowledge intelligent service technology is now seen as a fundamental solution to the challenges of organizing and utilizing agricultural information, enhancing the quality and yield of agricultural products (Zhao, 2023). Furthermore, a review of agricultural literacy studies underscores the pivotal role of formal education in fostering agricultural literacy among school-aged children, hinting at the requirement for innovative strategies (Cosby et al., 2022).

Education and age are very important for the sustainability of farmers' resources who are able to produce quality agricultural commodities. Based on the results of the 2018 inter-census agricultural survey, the agricultural workforce is mostly elderly, namely 20.8% 55-46 years old, 27.4% 45-54 years old, and 24% in the 35-44 year old age group 4% (Kementerian Pertanian,
The survey results show that young people’s interest in becoming agricultural entrepreneurs is still low. Therefore, it is necessary to increase young people’s interest in the agricultural sector, one of which is through applicable learning methods in schools about agriculture. Applicable learning about agriculture can be taught to middle school, elementary school age children, and even early childhood.

The younger generation tends to have less desire to work in the agricultural sector, especially to become a farmer because they are less likely to have a degree and provide less guarantee for the future (Susilowati, 2016). The younger generation has obstacles in becoming young farmers because they find that there is a lack of income for farmers, it is difficult to obtain ownership of an adequate farm, and there is a lack of availability of part-time jobs. This causes the younger generation to be reluctant to take up the farming profession and have no desire to be interested in agriculture. The lack of agricultural knowledge in the younger generation causes a decline in the younger generation’s interest in pursuing a career in agriculture. This phenomenon is a serious issue for agricultural poverty in Indonesia. Indeed, the digital transformation is reshaping the realm of agricultural knowledge, fostering enhanced human-tech connectivity and augmented transparency, although it does pose governance challenges (Fielke et al., 2020).

Currently, knowledge about agriculture among children is very low (Trexler, 2000), especially children who live in urban environments. Introduction to the potential of agriculture in early childhood has a great opportunity to increase interest, awareness and development in the future. Providing agricultural insight to early childhood can facilitate understanding and concern for nature and the surrounding environment, especially in the agricultural sector. For instance, a study by Kountios et al. (2023) emphasizes the influential role of Information and Communication Technology (ICT) in transmitting agricultural knowledge, shaping a competitive edge in the field.

Learning about agriculture at an early age will increase interest and liking for agriculture in young Indonesians from an early age. Early childhood learning programs with an agricultural perspective can equip children with knowledge about the importance of agriculture as well as basic skills such as caring for, watering and planting plants. Therefore, the aim of this research is to understand the importance of agricultural-based learning programs in early childhood education. This research uses the Preferred Reporting Items for Systematic Review and Meta-Analyze Extensions for scoping reviews using 3 databases, namely science direct, google scholar, and sage journals (Tricco et al., 2018).

Methods
In this research, we aim to review relevant literature regarding the importance of agriculture-based learning programs in early childhood to increase young children’s knowledge and interest in agriculture. The method used in this study was a scoping review using the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA ScR) checklist (Tricco et al., 2018). This design uses a number of questions prepared using 5 of the 6 stages developed by Arksey and O’Malley (Arksey & O’Malley, 2005). The 5 stages are identifying the research question, identifying relevant studies, study selection, data extraction, and collating, summarizing and reporting the results (Levac et al., 2010).

Identifying the research question
The questions in this research were prepared using specific keywords using PICO. Researchers used specific keywords which were arranged according to the PICO framework (Population, Intervention, Comparison, Outcome). PICO is a model for developing questions that are structured to be relevant (Eriksen & Frandsen, 2018).
Table 1. Scoping Review Questions

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<td>Early childhood</td>
<td>Have knowledge about agriculture</td>
<td>Lack of knowledge about agriculture</td>
<td>Increased knowledge and intelligence as well as emotional early childhood through agriculture-based learning</td>
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<td></td>
<td>Efforts to increase young children’s knowledge and interest in agriculture through agriculture-based learning programs in ECE</td>
<td>Lack of agriculture-based learning programs in ECE</td>
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Identifying relevant studies
The literature search will include both published and unpublished primary studies and reviews (grey literature). The databases used are Science Direct, Google Scholar, and Sage Journals. Search for relevant articles using keywords in English and Indonesian, namely: gardening-based learning program in early childhood education to increase knowledge and love of agriculture.

![Flowchart](https://example.com/flowchart.png)

**Figure 1. PRISMA Flowchart**

**Study Selection**
Literature selection was carried out by identifying relevant articles using inclusion and exclusion criteria. The first screening of the title and abstract was with inclusion criteria, namely original research, English or Indonesian, published between 2018-2023, complete article, and accessible free of charge. The second screening will be screened using exclusion criteria, namely articles, reviews, books and case reports. The literature obtained will be selected using PRISMA flowchart.
**Data extraction**

The article selection process uses Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMASCR) (Tricco et al., 2018). PRISMA flowchart is an evidence-based minimum set of items for reporting in systematic reviews and meta-analyses. PRISMA flowchart (Fig. 1) is considered appropriate to use because its use can improve the quality of publication reporting.

**Collating, summarising and reporting the results**

After the data extraction process on the 8 selected articles, it was continued to summarize with a qualitative description. The process of summarizing these 8 articles was carried out by filtering analysis, mapping and sorting material according to the main issues and themes by synthesizing related topics in relevant journal articles. This research examines journals related to the issue of the importance of agricultural-based learning programs in early childhood education environments to foster knowledge about agriculture.

**Result**

Search identification was carried out by searching for related articles in 3 databases, namely Science Direct 50 articles, Google Scholar 227 articles, and Sage Journals 69 articles. The total articles are 343 articles. Then eliminated in duplicate journals and other than the 2017-2023 publication time period. Next, the articles were screened based on the title and abstract to form 15 articles. Then the last one was screened based on the contents of the full text into 8 articles.

From the scoping review process, 8 selected articles were produced which were then compiled to find the characteristics of the articles through data mapping. The study conducted discussed the importance of agriculture in early childhood and agricultural or plantation-based learning programs that could be applied to early childhood. This study also compared the results of the analysis of the articles and reached a consensus through several discussions.

**Characteristics of the Article**

There were 8 articles that met the inclusion and exclusion criteria. Articles obtained There were 8 articles using qualitative and quantitative or mixed methods. The types of journals are mostly children’s education journals, environmental education for children, and journals about nutrition for children. Many research subjects also center on children’s intelligence, scientific and nature-friendly attitudes, cognitive, language, and social skills that children can acquire from gardening or agriculture-based learning. These results can be seen from the articles whose data have been extracted in Table 2.

From the data extraction that has been carried out, we found several conclusions about providing agricultural insight so that young children are interested and willing to carry out agricultural activities, apart from the lack of knowledge and interest of the younger generation in the agricultural sector, but also the many benefits for young children if they are given knowledge about agriculture. Some of the benefits that we summarize in the extraction of articles are Increasing young children’s knowledge and love for agricultural activities (Rymanowicz et al., 2020), Increasing children's naturalistic intelligence (Pratiwindya, 2018), Promoting healthy foods to young children (McCloskey et al., 2020), Nature-friendly attitude (Kim et.al., 2020), and Cognitive intelligence (Pratiwindya, 2018).

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<th>Author/year</th>
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<th>Research subject</th>
<th>Objective</th>
<th>Method/design</th>
<th>Conclusion</th>
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<tr>
<td>Murakami etal. 2017</td>
<td>Environmental education</td>
<td>Early childhood teacher</td>
<td>Describes a framework for children’s</td>
<td>Iterative qualitative analyzes</td>
<td>The Gourd Tee-Pee Model helps represent the perceived value of garden education</td>
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<td>McCloskey et al. 2020</td>
<td>Enviromental Research and Public Health</td>
<td>healthy eating behaviors of early childhood</td>
<td>Understand participation in the farm to ECE program and the perceived benefits and barriers of the three farm to ECE program components</td>
<td>A cross-sectional design</td>
<td>Farm-to-ECE programs offer healthy food promotion techniques through learning activities coupled with opportunities for repeated taste exposure and sensory exploration, which can build children's familiarity with new foods and increase the likelihood that they will accept healthy foods and diets (McCloskey et al., 2020).</td>
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<tr>
<td>Wells et al. 2023</td>
<td>Enviromental Research and Public Health</td>
<td>Physical Activity among Children Aged 3-5 Years in North Carolina</td>
<td>To examine the impact of a childcare gardening intervention on children's PA in a low-resource community</td>
<td>Linear mixed models (SAS v.9.4 PROC MIXED)</td>
<td>Gardening in daycare has potential as a CL intervention. Its impact is moderated by sex and age, with the impact being stronger for boys and the youngest child (Wells et al., 2023).</td>
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<td>Taniuchii et al. 2022</td>
<td>Nutrition and Gardening Intervention</td>
<td>Families of children attending Osage Nation ECE programs</td>
<td>To describe results from the six-month Food Resource Equity for Sustainable Health (FRESH) study among Native American families.</td>
<td>Randomized wait-list controlled trial design</td>
<td>Vegetable consumption increased significantly in the children’s intervention compared to controls for chayote and pea. Willingness to try increased for nuts in intervention children and tomatoes in both groups (Taniuchii et al., 2022).</td>
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<td>Rymanowicz et al. 2020</td>
<td>Early Childhood Environmental Education</td>
<td>children's cognitive, language, social skills, scientific inquiry, interaction with nature, interest in exploration</td>
<td>To bridges the gap between research and practice by presenting a description and program evaluation of the Farm Sprouts agriculture-based preschool program</td>
<td>Quantitative and qualitative data survey</td>
<td>Evaluation results show that agriculture-based programs have a positive impact on children's language and conversation skills, increase their interest in nature and desire to explore, and have a positive impact on family interactions (Rymanowicz et al., 2020).</td>
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<td>Pratiwindya et al. 2018</td>
<td>children's naturalistic intelligence</td>
<td>Parents and children</td>
<td>Understanding the influence of hydroponic gardening and parental involvement in improving early childhood naturalistic intelligence.</td>
<td>Ex post facto research/comparative quantitative research</td>
<td>The naturalistic intelligence of kindergarten children who garden hydroponically is higher than the group of kindergarten children who do not garden hydroponically (Pratiwindya, 2018).</td>
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<td>Kim et al. 2020</td>
<td>Childhood Education</td>
<td>Scientific and Nature-Friendly Attitudes in Children</td>
<td>To examine the park-based curriculum in South Korea and its impact on scientific and nature-friendly attitudes in children aged 4 to 6 years.</td>
<td>Qualitative and quantitative</td>
<td>The gardening-based curriculum provides opportunities to develop scientific attitudes namely curiosity and inquiry. Apart from that, direct experience opens children's eyes to the importance of nature and the value of harmony with nature, thus having an impact on increasing friendly attitudes</td>
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<td>Best &amp; Kerstetter 2019</td>
<td>Childhood Education</td>
<td>Children's Culture</td>
<td>Identify success factors for farm-to-school programs, drawing on evidence from exploratory case studies of farm-to-school programs in the Mid-Atlantic region located in densely populated urban areas</td>
<td>Systematic observation of program activities, writing fieldnotes of observation, coding and analysis of fieldnotes</td>
<td>Students from resource-rich environments are better able to utilize learning environments than students who have less access to contexts that combine learning and play. Social and educational disparities have different impacts on program success and student learning conditions (Best &amp; Kerstetter, 2020).</td>
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<td>Koyimah, S. 2023</td>
<td>Education</td>
<td>qualitatively describe the implementation of urban programs farming in PAUD units as an effort to reduce the level of dependence on gadgets and increase interest in farming from an early age</td>
<td>Qualitative</td>
<td>Urban farming can improve creativity and motor skills in young children, increase children's understanding of the environment and sustainability, encourage parental participation in children's education, and become an interesting alternative play activity for children (Koyimah, 2023).</td>
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<td>Brand M, et. al. 2017</td>
<td>Agricultural Education</td>
<td>students' agricultural literacy through National Agriculture Learning Goals</td>
<td>to further understand students' agricultural literacy through National Agriculture Learning Goals-based assessment of students' knowledge</td>
<td>a sequential exploratory mixed methods design</td>
<td>The agriculture program provides insight into strategies to increase the accessibility of the National Agriculture Learning Goals for elementary school students and teachers in addition to research findings showing a synergistic relationship between core STEM concepts and students' agricultural literacy (Brandt et al., 2017).</td>
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<td>Dannefer et. al. 2017</td>
<td>Journal of Hunger &amp; Environmental Nutrition</td>
<td>to encourage fruit and vegetable consumption</td>
<td>evaluation included product sales, redemption of product coupons provided through nutrition education, and nutrition school attendance, as well as cross-sectional surveys with parents and staff, child care center directors, nutrition educators, and child care center teachers.</td>
<td>4 separate surveys</td>
<td>Most agree that the curriculum is useful (97%), the curriculum is easy to use (87%), and learning is appropriate (84%). All teachers stated that students enjoyed gardening activities. The most frequently identified challenges were fitting weekly activities into class schedules (55%), lack of tools and equipment (24%), and lack of space (21%).</td>
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<td>Gustiana, et. al. 2019</td>
<td>Journal of Early Childhood Education</td>
<td>science process skills of young children</td>
<td>to determine the effectiveness of the method with activities gardening on the science process</td>
<td>Quasi Experiment with a Nonequivalent Control Group Design research design</td>
<td>The implementation of science learning using gardening activities to improve the science process skills of group B kindergarten children is developing well (Deni Gustiana et al., 2019).</td>
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<tr>
<td>Mirawati and Nugraha</td>
<td>Early</td>
<td>early childhood science process skills</td>
<td>to see the initial conditions of early childhood science process skills before implementing gardening activities, an overview of the implementation of gardening activities in Kindergarten Lab. UPI, as well as increasing children's science process skills after implementing gardening activities.</td>
<td>qualitative data analysis using thematic analysis techniques</td>
<td>Gardening activities can make a positive contribution to improving science process skills in Kindergarten Lab. UPI. Gardening also contributes to children's physical-motor, language, cognitive, social-emotional and moral-religious development (Mirawati &amp; Nugraha, 2017).</td>
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**Discussion**

Early childhood is very important for children's cognitive, psychomotor, social and emotional development, therefore there is a need for innovation in children's learning by directing learning activities that stimulate children's creativity and imagination. Some programs that can be carried out in the early childhood learning process are agricultural or gardening activities which have many benefits for the development of children's intelligence and emotions. The benefits of gardening activities or other agricultural activities in early childhood can be seen in the following explanation:

**Increasing young children's knowledge and love for agricultural activities**

Agriculture-based learning given to early childhood can become a habit in children regarding matters related to farming activities (Rymanowicz et al., 2020). This agricultural-based program can be made part of the early childhood education curriculum so that it can be implemented more intensively so that children of this age are accustomed to carrying out agricultural activities, namely outdoors. Agricultural activities, especially outdoor ones, can give children experience in getting to know their surroundings and becoming more environmentally friendly (Chawla, 1998). The introduction to agriculture given to elementary school students is also able to increase children's liking for agriculture and their desire to work in the agricultural sector.

The learning materials that can be delivered are simple activities such as explanations using children's language about plants, flowers, fruit or vegetables. Then you can also carry out gardening activities that do not burden children, such as planting flowers, picking fruit, and eating agricultural products. This activity will provide greater opportunities for children to explore the origins of food, gardening and nature (Rymanowicz et al., 2020).

**Improve children's naturalistic intelligence**

Naturalistic intelligence is a form of intelligence to love the environment and fellow living things. In addition, naturalistic intelligence is also related to the capacity to recognize and classify certain features in the surrounding physical environment, such as animals, plants and weather conditions. Agriculture-based activities can increase naturalistic intelligence (Pratiwindya, 2018).
According to Rosenow (Rosenow, 2008), when children explore the environment, they also develop new knowledge and relate it to knowledge that children already know. This agricultural activity provides an opportunity for children to be directly involved in the process of growing plants which will become the source of the food they eat later.

The study conducted shows that hydroponic gardening activities can improve children’s naturalistic intelligence in kindergarten children compared to kindergarten children who do not do hydroponic gardening activities (Pratiwindya, 2018). In addition, parental involvement in children’s gardening activities also affects children’s naturalistic intelligence. Children who are accompanied by their parents in gardening activities will have better children’s naturalistic intelligence than children who do gardening activities but are not accompanied by their parents (Faridy & Rohendi, 2020; Pratiwindya, 2018).

Promoting healthy foods to young children
Some agricultural activities are mostly aimed at improving health, increasing children’s willingness to try new foods, and increasing fruit and vegetable consumption (Izumi et al., 2015; Nameneck Brouwer & Benjamin Neelon, 2013). Research by Taniguchi explains that agricultural activities can significantly increase the intake of vegetables such as chayote, beans, and tomatoes (Taniguchi et al., 2022). Other researchers also explained that the impact of gardening has an influence on vegetable consumption (Farfan-Ramirez et al., 2011) in children because farming activities can increase children’s willingness to try new foods (Izumi et al., 2015).

Nature-friendly attitude
Gardening activities can foster children’s curiosity and make observations naturally. This activity is liked by children because it is fun for them to be able to solve problems and answer their questions with fun activities (Eriksen & Frandsen, 2018). Kim et al. (Kim et al., 2020) explains that gardening activities that are used as a curriculum will provide opportunities to develop a scientific nature and curiosity about nature. Children will also realize the importance of protecting nature through planting experiences. They will be more enthusiastic about caring for and watering plants (Kim et al., 2020) so that they will develop a sense of concern for the environment (Chawla, 1998).

Cognitive intelligence
Another benefit of gardening for children is that it improves children’s memory and focus. Children have a tendency to prefer studying outdoors and children who like nature are better able to focus and can improve cognitive skills. Gardening activities which are quite complex for early childhood require children to learn to focus and be calm in doing something (Klemmer et al., 2005; Smith & Motsenbocker, 2005).

Conclusion
Early childhood learning programs with an agricultural perspective can equip children with knowledge about the importance of agriculture as well as basic skills such as caring for, watering and planting plants. The literature reviewed from the scoping review found 8 articles that had fulfilled their requirements using qualitative and quantitative or mixed methods. The types of journals produced are mostly children’s education journals, environmental education for children, and journals about nutrition for children. Research subjects also focus on children’s intelligence, scientific and nature-friendly attitudes, cognitive, language and social skills that children can gain from gardening or agriculture-based learning. Data extraction and preparation of literature material benefit from agricultural-based learning programs. This benefit is the basis for the importance of agriculture-based learning for kindergarten children. The benefits of agricultural-based learning activities in ECE include increasing young children’s
knowledge and love of agricultural activities, increasing children's naturalistic intelligence, promoting healthy foods to young children, nature-friendly attitude, and cognitive intelligence.

References


