

The current status of educational games in nutrition education for 5- to 6-year-old children at selected preschools in Hung Yen province, Vietnam

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Abstract - Nutrition education plays a crucial role in developing knowledge, attitudes, and healthy eating habits among preschool children. This study aims to assess the current status of the use of educational games in nutrition education for 5–6-year-old children at 12 preschools in Hung Yen Province, Vietnam. The study employed a questionnaire survey of 120 preschool teachers combined with observations of 24 educational activities. Data were analyzed using descriptive statistics. The results showed that teachers frequently used physical games combined with food classification and games involving pictures and flashcards in nutrition education, while digital games were used very sparingly. Teachers were assessed as having fairly strong competencies in setting objectives and organizing games, but were limited in their ability to design and create new games. The main challenges affecting implementation include a lack of specialized nutrition teaching materials, large class sizes, work pressure, and a lack of professional development opportunities. The study's findings provide a practical foundation for developing teacher training programs, investing in teaching materials, and improving conditions for organizing educational games to enhance the effectiveness of nutrition education for preschool children.

Key words: Educational games; Nutrition education; Children aged 5–6; Preschools; Hung Yen Province.

1. INTRODUCTION

The early childhood stage, particularly for children aged 5–6, plays a pivotal role in children's holistic development. Nutrition education in preschool settings goes beyond simply providing nutritionally balanced meals; more importantly, it aims to instill in children a scientific understanding of the four food groups, healthy food safety habits, and an attitude of appreciation for food (Loan et al., 2023). For 5–6-year-olds, play remains the primary activity; therefore, the "learning through play, playing to learn" approach via educational games is considered the most natural and effective way to convey complex nutritional concepts (Behnamnia et al., 2023; Liu et al., 2021). Educational games harmoniously combine cognitive tasks with engaging play activities, helping children absorb knowledge voluntarily and enthusiastically without feeling pressured (Kokkalia et al., 2017).

Although the Vietnamese Ministry of Education and Training has issued guidelines on nutrition education in the

early childhood education curriculum (Ministry of Education and Training, 2022), actual implementation at the local level—particularly in Hung Yen Province—continues to face numerous obstacles. Hung Yen Province is undergoing rapid economic transformation, where disparities between industrialized and rural areas create significant gaps in infrastructure and access to advanced educational methods. Previous studies have primarily focused on the current state of clinical nutrition or on summary-based best practices at individual institutions, lacking systematic empirical surveys on the extent, forms, and organizational capacity of preschool teachers in Hung Yen Province to incorporate educational games into nutrition education.

This study was conducted to address gaps in previous research on the use of educational games in nutrition education for preschool children. From a theoretical perspective, the study helps clarify the scientific basis for integrating educational games into nutrition education activities for children in the context of developing countries. From a practical perspective, the study's findings objectively reflect the current status of educational game implementation in nutrition education at several preschool schools in Hung Yen Province, thereby providing a basis for education administrators to develop teacher training plans and invest in appropriate facilities and learning materials to improve the quality of nutrition education for children.

To comprehensively assess the current status of educational games in nutrition education for 5–6-year-olds at several preschools in Hung Yen Province, this study focuses on answering the following three questions:

1. How frequently and in what forms are educational games currently used by preschool teachers in Hung Yen Province in nutrition education activities for 5–6-year-olds?
2. How do teachers assess their own competence in designing and organizing educational games, and how effective do they consider these games to be in nutrition education?
3. What challenges are affecting the design and organization of educational games in nutrition education at the preschools in the study area?

2. LITERATURE REVIEW

Research on educational games in early childhood education is grounded in theories of cognitive development, most notably Piaget's theory of cognitive development. According to Piaget and Inhelder (1972), children aged 2 to 7 are in the preoperational stage. At this stage, children think primarily



through images and symbols; their capacity for logical reasoning is still limited, but they have made significant progress in language, imagination, and symbolic play. Children acquire knowledge most effectively when they can directly manipulate objects and participate in experiential activities and play that are appropriate for their developmental stage. Therefore, educational games are an appropriate pedagogical tool for transforming abstract nutritional concepts- such as nutrient groups or the benefits of food- into vivid, engaging, and easy-to-understand experiences, thereby helping children develop positive nutritional awareness and behaviors.

In addition, Vygotsky's (1978) theory of social development emphasizes the concept of the Zone of Proximal Development and the role of social interaction. According to Vygotsky (1978), play creates the Zone of Proximal Development, in which children can achieve higher levels of cognitive development through adult support or cooperation with peers. Adhering to rules during play contributes to the development of self-regulation skills, while also providing opportunities for children to construct knowledge through communication and social interaction.

There have been numerous international studies on game-based educational methods. Lozada et al. (2019) found that an educational game system utilizing MS-Kinect technology was rated by teachers as highly useful and well-accepted in the classroom. Meanwhile, Vahedi and Bigdeli (2018) demonstrated that educational games have a positive impact on the academic performance and cognitive development of preschool children. Nikolayev et al. (2020) pointed out that most educational games today are limited to providing simple feedback and have not effectively utilized instructional feedback to promote learning. Meanwhile, Gözümlü and Kandır (2021) show that most children are not guided by their parents in selecting games with educational content, which limits the educational value of the games.

Some studies have shown that digital games are an effective tool in nutrition education for preschoolers. Hassanzadeh-Rostami et al. (2018), Chang et al. (2022), and Chang and Yen (2023) all noted that the use of computer-based games or sensor-based games helps improve children's nutrition knowledge while increasing their interest and level of engagement in learning activities. Additionally, Oh and Kim (2007) developed the interactive multimedia software "Nutrition Exploration," affirming the potential of educational games in fostering healthy food-choice habits in children as early as preschool age. An experimental study by Aygun et al. (2026) in Turkey showed that a 12-week game-based nutrition education program (including picture cards, puzzles, and role-playing games) significantly increased actual vegetable and fruit consumption among preschoolers ($p < .001$).

In Vietnam, research on educational games in early childhood education has primarily focused on the development of children's cognitive, language, and mathematical skills, as well as their early understanding of symbols. Meanwhile, research on nutrition education has

mainly addressed topics such as child care, the formation of eating habits, or experiential activities. Research directly combining educational games and nutrition education for early childhood students remains very limited, primarily confined to theses or small-scale studies, and does not fully reflect the current state of implementation in early childhood education settings.

The literature review indicates that although the positive role of educational games in nutrition education has been widely recognized worldwide, there remains a significant research gap in the practical context of Hung Yen Province. International studies often focus on high-tech solutions or digital games, which are not entirely suitable for the actual infrastructure conditions at many preschools in rural areas of Vietnam. On the other hand, domestic studies have not yet clearly elucidated the correlation between teachers' pedagogical competencies, resource constraints, and the actual effectiveness of implementing nutrition-based educational games. This study was designed to fill that gap by conducting a comprehensive assessment of the current situation in Hung Yen Province.

3. RESEARCH METHODOLOGY

The study employed a cross-sectional descriptive design combining a quantitative questionnaire-based survey as the primary method with direct pedagogical observation for comparison and field verification.

The study sample was selected using random sampling from a list of preschools in Hung Yen Province. A total of $N = 120$ preschool teachers currently teaching classes of 5–6-year-olds at 12 preschools (including 8 public and 4 private schools, representing both urban and rural areas) participated in the survey. The sample consisted entirely of female teachers with an average years of service of $M = 8.6$ years, of whom 84.2% held an associate's degree or higher in Early Childhood Education. Additionally, 24 nutrition education activities incorporating educational games were randomly selected for direct observation.

The main data collection tools included:

Teacher questionnaire: Designed based on the theoretical framework of educational games and indicators for early childhood nutrition education. The questionnaire consisted of 18 closed-ended questions using a 3-point Likert scale. Based on the difference between the maximum and minimum values of the scale ($((3-1)/3=0.67)$), the average score is categorized as follows: 1.00–1.66: Low; 1.67–2.33: Moderate; 2.34–3.00: High.

The questionnaire assesses four aspects: Frequency of using different types of games; Teachers' design and organizational skills; Assessment of children's reactions and perceptions; and Barriers to implementation.

Pedagogical Observation Form: Designed to assess the process of organizing games, the level of preparation of materials, children's engagement, and the presence of the

structural components of educational games (purpose, play actions, and rules).

The study was conducted in three phases. Phase 1: Pilot testing of the instruments with $n = 15$ teachers outside the main sample to refine terminology and test reliability. Phase 2: Distribution of the official questionnaire to 120 teachers and classroom observations of 24 lessons at 12 selected preschools. Phase 3: Data cleaning, coding, and statistical analysis.

Quantitative data were processed using Excel. Descriptive statistics, including frequency (n) and mean (M), were used to describe the current situation. The study complied with educational research ethics guidelines. The principals of the preschools and all participating teachers were clearly informed of the study's purpose, gave their voluntary consent to participate, and had the right to withdraw.

4. RESEARCH FINDINGS AND DISCUSSION

4.1. Current status of the use of educational games in nutrition education for 5- to 6-year-old children at selected preschools in Hung Yen province

4.1.1. Current status of the use of various types of educational games in nutrition education for 5–6-year-old children

To clarify the current status of the use of various types of educational games in nutrition education for 5–6-year-old children, this study surveyed the frequency of use of five common types of educational games among 120 preschool teachers at several schools in Hung Yen Province. The results are presented in Table 1.

Table-1: Frequency of use of various types of educational games in nutrition education ($N = 120$)

Types of educational games	Frequently	Occasionally	Never	Average	Rating
Physical games for food sorting	78	38	0	2.58	1
Educational games with pictures/flashcards	62	45	13	2.42	2
Trivia and guessing games/language games about nutrition	54	51	15	2.33	3
Role-playing games (supermarket)	41	58	21	2.17	4
Digital/interactive computer games	9	27	84	1.38	5

Table 1 shows that preschool teachers at several schools in Hung Yen Province use various types of educational games to varying degrees in nutrition education for 5–6-year-olds. Among these, physical games involving food sorting were used most frequently (mean = 2.58), ranking first. As many as 65.0% of teachers reported frequently organizing this type of game, while only 6.7% never used it. These results indicate that physical games involving food sorting align with the developmental characteristics of preschoolers, are easy to organize, and provide opportunities for children to learn through experience.

In second place were learning games using pictures/flashcards (mean = 2.41). More than half of the teachers (51.7%) frequently use this format. This is a visual game type that is easy to prepare and helps children

recognize food groups, colors, characteristics, and the nutritional value of foods.

Trivia and guessing games/language activities related to nutrition scored an average of 2.33, ranking third. Although 45.0% of teachers use them regularly, 42.5% use them only occasionally. This indicates that teachers have begun to utilize language-based games to reinforce nutrition knowledge, but the frequency of use is not yet consistent.

For role-playing games such as “Kitchen” or “Nutrition Supermarket,” the average score was 2.17, ranking fourth. The majority of teachers (48.3%) only organized these games occasionally. This may be because this type of game requires more preparation time, teaching materials, and organizational skills than simpler games.

Notably, digital games or interactive computer games had the lowest usage rate (average = 1.38), ranking last. As many as 70.0% of teachers reported never having used this type of game, while only 7.5% use them frequently. These results reflect the limited application of digital technology in nutrition education at preschools, which may be due to a lack of equipment, suitable software, or insufficient training for teachers in designing and organizing digital games.

Overall, teachers tend to prioritize traditional, visual, and easy-to-implement games such as physical activities, pictures, and flashcards, while digital games have not been utilized effectively.

4.1.2. Teachers' pedagogical competence in organizing educational games on nutrition

To assess teachers' pedagogical competence in designing and organizing educational games on nutrition for 5–6-year-olds, this study examined five core aspects related to the process of preparing and organizing these activities. The results are presented in Table 2.

Table- 2: Level of pedagogical competence among teachers in organizing nutrition-related learning games ($n = 120$)

Content	Good	Fair	Unsatisfactory	Average	Rating
Identify appropriate nutrition learning objectives	62	31	7	2.63	1
Explain the rules of the game and provide instructions on how to play	79	35	6	2.63	2
Prepare materials and visual aids	51	52	36	2.40	3
Create/design new games based on the theme	28	54	38	2.29	4
Guide the children, engage their interest, and ensure all children are included	68	42	10	2.92	5
Overall mean				2.39	

Teachers' pedagogical competencies in organizing educational games on nutrition were self-assessed as “fair,” with an overall average score of 2.39. This indicates that the majority of teachers possess the basic competencies to organize nutrition education activities through games; however, there are still some areas that require further professional development.

The highest-rated area was identifying appropriate nutrition learning objectives (average score = 2.63), ranking first. Sixty-eight point three percent of teachers self-assessed their performance as “good,” while only 5.8% believed they

did not meet the requirements. These results reflect that teachers clearly understand nutrition education objectives and are capable of selecting content appropriate for children's developmental characteristics.

Ranking second was the ability to explain the rules of the game and provide guidance on how to play (mean = 2.61). Sixty-five point eight percent of teachers rated themselves as "good," indicating that the majority of teachers possess clear instructional skills that help children understand the rules and participate actively in activities.

The ability to lead, engage, and oversee children scored 2.48 points, ranking third. This indicates that teachers are fairly confident in maintaining children's participation throughout the game-organizing process, thereby contributing to the effectiveness of educational activities.

Meanwhile, the ability to prepare materials and visual learning aids scored only 2.29 points, ranking fourth. Although the majority of teachers rated their performance as "fair" or "good," 13.3% of teachers still felt they did not meet the requirements. This result may be related to facility conditions, funding, or the time available for preparing learning materials at preschool schools.

Notably, creativity and the design of new theme-based games had the lowest average score (average = 1.92), ranking last. Only 23.3% of teachers self-assessed their performance as "good," while as many as 31.7% believed this competency did not meet the requirements. This indicates that many teachers still primarily rely on ready-made games and have not yet taken the initiative to design or adapt games to align with nutrition education goals and the practical conditions of the classroom.

These results show that teachers have strengths in organizing and facilitating games but are still limited in designing and creating educational games.

4.1.3. Assessment of children's cognitive performance and attitudes toward nutrition through educational games

To assess the cognitive performance and attitudes toward nutrition of 5-6-year-old children after participating in educational games, the author observed 24 educational activities and conducted a survey of 120 preschool teachers. The results are presented in Table 3.

Table-3: Teachers' assessments of the cognitive performance and nutritional attitudes of 5-6-year-old children through educational games (n=120)

Children's performance criteria	Good	Fair	Unsatisfactory	Average	Rating
Identify and correctly classify the four food groups	76	38	6	2.58	2
Show interest and actively participate in the game	91	24	5	2.72	1
Remember the benefits of various vegetables, tubers, and fruits	58	49	13	2.38	3
Practice good hygiene and table manners	52	55	13	2.33	4
Overall mean				2.58	

Children's nutritional knowledge and attitudes following participation in the educational game were rated by teachers as "fair," with an overall average score of 2.50. This indicates that the educational game played a positive role in helping 5-6-year-olds develop proper knowledge and attitudes toward nutrition.

The highest-rated criterion was interest and active participation in the game (mean = 2.72), ranking first. As many as 75.8% of the children were rated as "good," while only 4.2% did not meet the requirements. These results show that the educational game is appealing to children, motivating them to actively participate in nutrition education activities.

Ranking second was the criterion for correctly identifying and classifying the four food groups (mean = 2.58). Sixty-three point three percent of the children achieved a "good" rating, and only 5.0% did not meet the standard. This suggests that integrating nutrition content into games has helped children remember and identify food groups relatively effectively.

The criterion for recalling the benefits of various vegetables, tubers, and fruits scored 2.38 points, ranking third. Although nearly half of the children (48.3%) were rated at the "good" level, 40.8% remained at the "average" level. These results indicate that children are beginning to understand the role of certain foods in health; however, their ability to recall and apply this knowledge still needs to be further reinforced through ongoing educational activities.

The criterion with the lowest average score was hygiene practices and dining etiquette (average score = 2.33), ranking fourth. Only 43.3% of children achieved a "good" level, while 45.8% were at an "average" level and 10.8% did not meet the standard. This indicates that although educational games have a positive impact on cognitive development, transforming knowledge into actual behaviors and habits requires time, regular practice, and collaboration between schools and families.

Overall, the survey results show that educational games not only spark children's interest but also help raise their awareness of nutrition. However, the effectiveness in fostering positive nutritional behaviors and habits is not yet consistent; therefore, it is necessary to strengthen experiential activities and create opportunities for children to practice regularly in both their learning and daily living environments.

4.2. Challenges in implementing educational games on nutrition

To identify the challenges affecting the organization of educational games on nutrition for 5-6-year-olds, the author surveyed 120 preschool teachers regarding the extent of these challenges. The results are presented in Table 4.

Table -4: Challenges in implementing educational games on nutrition (n = 120)

Content	Strong impact	Moderate impact	No impact	Average	Rating
Lack of specialized equipment and learning materials on nutrition	86	26	8	2.65	1
Large class sizes and limited classroom space	79	31	10	2.58	2
Time constraints and heavy administrative workload	71	38	11	2.50	3
Lack of in-depth training materials on nutrition games	65	43	12	2.44	4
Lack of coordinated cooperation from families	58	47	15	2.36	5
Overall mean				2.51	

Table 4 shows that preschool teachers rated the challenges in implementing educational games on nutrition as having a fairly high impact, with an overall average score of 2.51. This reflects the fact that organizing educational games in nutrition education still faces many challenges, ranging from physical facilities and the organizational environment to professional support capabilities.

The barrier rated as having the greatest impact was the lack of specialized nutrition-related materials and learning resources (mean score = 2.65), ranking first. As many as 71.7% of teachers believed this factor strongly affected the organization of educational games, while only 6.7% felt it had no impact. The results indicate that the lack of visual learning materials, toys, and nutrition-themed game sets has limited the ability to design rich and engaging learning activities for children.

Ranking second were large class sizes and limited classroom space (mean = 2.58). 65.8% of teachers assessed this as a major barrier. With large class sizes and limited classroom space, teachers face difficulties in organizing physical games and group activities, as well as in monitoring and supporting each child during participation.

Time pressure and the administrative workload ranked third with a mean score of 2.50. 59.2% of teachers believe this is a factor that strongly affects the implementation of educational games. This indicates that, in addition to their duties of caring for and educating children, teachers must also perform numerous professional and administrative tasks, reducing the time available for designing and preparing learning materials.

The barrier of a lack of in-depth training materials on nutrition games scored an average of 2.44, ranking fourth. Although most teachers recognize the role of games in nutrition education, many still lack access to in-depth professional development programs or specific instructional materials to design and organize appropriate games.

Lack of coordination from families received the lowest average score (average score = 2.36), yet it was still assessed as having a moderate level of impact. 48.3% of teachers believe this is a major barrier. This indicates that developing children's nutritional knowledge and habits depends not only on educational activities at school but also on consistency in the guidance and training provided by families. When parents are not engaged or do not cooperate regularly with the school, the effectiveness of nutrition education through games will be limited.

Overall, the survey results show that the prominent challenges in implementing educational nutrition games are primarily related to implementation conditions (supplies, learning materials, facilities), organizational conditions (class size, time), and professional support (training materials).

4.3. Discussion

The study findings show that teachers at several preschools in Hung Yen Province have actively implemented the use of educational games in nutrition education for 5–6-year-olds; however, there are differences in the extent to which various types of games are used. Physical activity games that incorporate food sorting and games using pictures and flashcards were used most frequently by teachers. These are simple, easy-to-prepare activities that are well-suited to the developmental characteristics of older preschoolers, helping children acquire knowledge through visual activities and hands-on experiences. These findings align with the views of Piaget and Inhelder (1972), who argued that children in the preoperational stage learn most effectively through manipulating objects, images, and experiential activities.

In contrast, digital games and interactive computer games were used very sparingly. This reflects the reality that many early childhood education settings still lack technological equipment, appropriate educational software, and the conditions necessary to implement digital educational activities. These findings are also consistent with studies by Nikolayev et al. (2020) and Gözümlü and Kandır (2021), which suggest that the effectiveness of digital games depends not only on the games themselves but also on the conditions under which they are implemented and the support provided by teachers and families.

The survey results also showed that teachers rated their ability to set nutrition education goals and guide children in participating in games quite highly. However, their ability to be creative and design new games based on specific themes was limited, receiving the lowest scores. This suggests that most teachers still primarily use existing games or adapt familiar activities, and have not yet taken the initiative to develop new games tailored to nutrition education goals. This finding may be related to a lack of instructional materials, specialized learning resources, and professional development programs on educational game design.

On the children's side, teachers' observations and evaluations showed that most children were enthusiastic about participating in educational games and demonstrated a fairly good ability to identify and classify food groups. However, their ability to remember the benefits of foods and to develop behaviors such as hygiene and dining etiquette remains at a lower level. This suggests that educational games have a positive effect in generating interest and fostering initial awareness, but transforming knowledge into behavior requires a process of regular practice along with collaboration between schools and families. These findings align with Piaget's theory of cognitive development and Vygotsky's sociocultural theory (1978), which emphasize the

role of experience, interaction, and adult support in children's learning process.

In addition to these positive results, the study also identified several barriers that affect the implementation of educational games in nutrition education. The biggest challenge is the lack of specialized nutrition-related materials and resources, followed by large class sizes, limited classroom space, and time constraints. In addition, many teachers reported that they had not participated in in-depth training programs on the design and organization of educational games in nutrition education. These challenges lead teachers to tend to choose simple, easy-to-organize games rather than those that require extensive learning materials or are highly creative.

From a theoretical perspective, this study provides additional empirical evidence regarding the role of educational games in nutrition education for preschool children, while also reinforcing the value of theories of cognitive development and social learning in designing educational activities tailored to children's developmental characteristics.

From a practical perspective, the study's findings indicate a need to increase investment in educational materials and resources for nutrition education, particularly visual game sets, picture cards, food models, and open-ended learning materials suitable for preschool settings. At the same time, educational institutions and administrative agencies need to organize professional development programs on the design, organization, and utilization of educational games in nutrition education, thereby enhancing teachers' competencies and contributing to improving the quality of nutrition education for preschool children.

5. CONCLUSIONS

The study examined the current status of the use of educational games in nutrition education for 5- to 6-year-olds at several preschools in Hung Yen Province. The results show that educational games are considered by teachers to be an appropriate educational tool, helping to stimulate children's interest in learning and supporting them in developing foundational knowledge about nutrition. In practice, teachers primarily use physical games, picture-based games, and flashcard games, while role-playing games and games incorporating digital technology are still used to a limited extent. Furthermore, although teachers demonstrated relatively strong abilities in setting objectives and organizing games, their capacity to design and create new games remains limited. The implementation of educational games in nutrition education is also hindered by various challenges, such as a lack of specialized teaching materials, large class sizes, work pressure, and professional development opportunities that do not yet meet requirements.

This study helps provide empirical evidence on the current state of organizing educational games in nutrition education

at preschool institutions, while also serving as a foundation for educational institutions and regulatory agencies to develop appropriate solutions aimed at improving the quality of nutrition education for children. Based on the study's findings, priority should be given to investing in and developing a system of educational materials, supplies, and games for nutrition education suitable for preschool children; strengthening teacher training in the design and organization of educational games; and promoting collaboration between schools and families in establishing and maintaining healthy eating habits for children. These measures will help improve the effectiveness of nutrition education and meet the requirements for reforming early childhood education in the current phase.

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