

High-quality Practices to Support Food Literacy in Preschool Education: A Literature Review

Isabelle Deshaies^{1,a,*}, Crystel Bizier^{2,b}, Marilène Deshaies^{3,c}, Éline Thiffault^{3,d}

¹Professor in the Department of Educational Sciences, Université du Québec à Trois-Rivières, Trois-Rivières, Canada

²Master's Student in Educational Sciences, Université du Québec à Trois-Rivières, Trois-Rivières, Canada

³Nutritionists for the Public Health Department, Centre Intégré Universitaire De Santé Et De Services Sociaux De La Mauricie-Et-Du-Centre-Du-Québec (CIUSSSMCQ), Trois-Rivières, Canada

^aisabelle.deshaies2@uqtr.ca, ^bcrystel.bizier@uqtr.ca, ^cmarilene.deshaies@ssss.gouv.qc.ca,

^dethiffault_cssstr@ssss.gouv.qc.ca

*isabelle.deshaies2@uqtr.ca

Abstract: While the promotion of healthy and sustainable eating habits in early childhood represents a major public health concern, food literacy remains insufficiently and inconsistently integrated into preschool educational practices. This literature review aims to examine teaching practices that support the development of food literacy among children aged 4 to 6 years (functional, relational, and systemic competencies), with particular attention to sustainability education, environmental awareness, and children's understanding of food systems, in alignment with a developmental approach. The methodology is based on the PRISMA protocol recommendations to ensure rigor and reproducibility in the selection of the literature. A thematic analysis of 21 scientific articles reveals a pre-dominance of practices centered on structured, experiential activities oriented toward behavioral objectives. These practices primarily mobilize functional competencies and, to a lesser extent, relational ones, while the systemic dimension—including understanding food origins, resource preservation, food waste, and the environmental impacts of food choices—despite being essential to education for sustainable development, remains marginal. Moreover, the findings highlight a limited consideration of preschool-specific educational contexts, particularly free play, daily routines, and spontaneous interactions, despite their potential to foster eco-citizenship and meaningful engagement with sustainability issues through authentic daily experiences. These observations point to an imbalance in teaching practices, characterized by a predominance of the pedagogical pillar at the expense of a more integrated articulation of the didactic and relational dimensions. They underscore the need to develop more coherent, contextualized, and reflective teaching practices in order to support comprehensive, critical, and sustainable food literacy grounded in children's lived experiences and connected to the broader goals of Education for Sustainable Development (ESD).

Keywords: Food Literacy; Teaching Practices; Preschool Education; Classroom Contexts; Sustainable Development

1. Introduction

In a global context marked by rising rates of childhood obesity, food-related disorders, and inequities in access to healthy nutrition, food literacy has emerged as a fundamental determinant of public health [1, 2]. Food literacy refers to the set of knowledge, skills, and attitudes required to understand the food system, make informed choices, and engage in responsible practices regarding food, health, and ecosystem sustainability [3, 4]. This concept has progressively evolved to encompass not only nutrition, but also the cultural, social, emotional, and environmental dimensions of the relationship with food [5, 6]. The literature review by Truman et al. (2017) [2] argues that food literacy extends beyond functional skills (e.g., reading a nutrition label) to include a critical understanding of food systems, integrating social and ecological issues as well as the capacity to act as an informed citizen. This perspective aligns with the Sustainable Development Goals, in which individuals become conscious actors aware of the impact of their consumption on planetary resources [7].

The Veggies4myHeart study [8] highlights that the development of food literacy in early childhood

constitutes an important lever for promoting overall health, preventing chronic diseases, and fostering sustainable eating habits. The early years of life represent a critical period during which children develop preferences, behaviors, and social representations that tend to persist into adulthood [1, 8, 9]. It is therefore widely acknowledged that early interventions grounded in a holistic perspective can improve diet quality, support cognitive development, and contribute to the emergence of eco-citizenship awareness from a very young age [10, 11, 12].

Nevertheless, although the benefits of food literacy are widely recognized, research specifically addressing educational practices in preschool settings remains limited [1, 13]. Most studies focus on elementary or secondary education, leaving the preschool years as a blind spot, despite their strategic importance in shaping dietary and environmental behaviors [1, 13]. This lack of data hinders the development of targeted educational programs that are evidence-based and adapted to the developmental capacities of young children [8, 14]. Early childhood education and care settings nevertheless represent ideal environments for supporting the development of food literacy [8, 14]. In addition to meeting children's fundamental needs, these settings provide structured routines and rich learning contexts through which the food life cycle can be explored [14, 15]. Teachers and early childhood educators play a strategic role as dietary role models and as mediators of social and environmental learning [14]. However, this potential is constrained by major barriers: educators frequently report feeling insufficiently trained and inadequately equipped to integrate these dimensions into their practices [3, 16]. Gaps remain both in nutritional knowledge and in the ability to address sustainability issues effectively [15, 17, 18].

It therefore becomes essential to gain a better understanding of which educational practices are effective in fostering food literacy in preschool settings, and how these practices contribute to the development of a healthy and sustainable relationship with food. Accordingly, this literature review seeks to answer the following question: What high-quality teaching practices support food literacy grounded in a sustainable development perspective in preschool education?

2. Theoretical Framework

This section aims to define food literacy and clarify its foundations within the context of early childhood, grounding it in a sustainable development perspective. It then examines food literacy competencies in preschool education and presents the teaching practices that support the development of these competencies among young children.

2.1. Food Literacy in Early Childhood

Food literacy can be defined as an integrated set of knowledge, practical skills, attitudes, and behaviors that enable individuals to navigate their food environment, make informed decisions, and contribute to the sustainability of food systems [3, 4]. This definition aligns with the aims of Education for Sustainable Development (ESD), which seeks to equip learners with cross-cutting competencies to address global challenges [19, 20].

In the context of early childhood, food literacy is embedded in sensory, social, and educational experiences adapted to the overall development of children aged 2 to 7 years. It plays a determining role in the early formation of food preferences, food-related socialization, and the adoption of sustainable eating behaviors [8, 21]. In this regard, it contributes to the development of key sustainability competencies, such as system thinking and normative competence, enabling children to perceive the connections between their actions and their environment [19, 22]. At this age, learning is deeply rooted in lived experience, play, and social interactions.

2.2. Food Literacy Competencies and Their Integration into Preschool Education

To better define the expected learning outcomes, Slater (2022) [23] proposes a framework organized around three types of competencies: functional, relational, and systemic. This framework directly resonates with UNESCO's (2017) [19] learning objectives, which distinguish between the cognitive (knowledge), socio-emotional (values and relationships), and behavioral (action) domains. These competencies make it possible to move beyond a strictly nutritional conception of food to encompass its social, cultural, and environmental dimensions.

Functional competencies refer to basic knowledge about food, food recognition, and the skills required to make responsible food choices and participate in simple food-related practices. Relational

competencies involve the development of a positive relationship with food, including enjoyment of eating, curiosity, socialization, and interactions surrounding meals. Finally, systemic competencies entail a broader understanding of food, particularly regarding the origin of foods, their transformation, and their integration within social and environmental systems. McManus et al. (2025) [7] further emphasize that the intersection between food literacy and sustainability requires both critical and anticipatory competencies, enabling individuals to understand production cycles and the impact of food waste [24, 25]. Figure 1 illustrates these competencies.

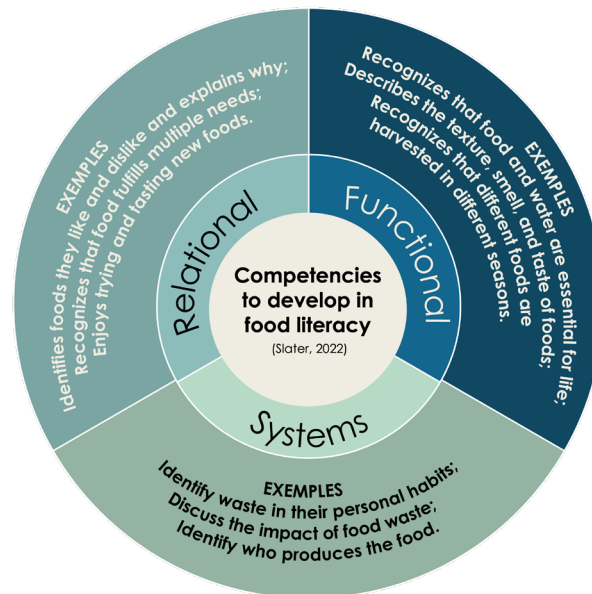


Figure 1. Food Literacy Competencies to Be Developed among Children Aged 2 to 7 Years (inspired by [26] Thiffault et al., 2025, adapted from [23] Slater, 2022, free translation).

In preschool settings, these competencies develop progressively and in an interconnected manner through rich educational experiences grounded in children's everyday lives. As emphasized in the Quebec Education Program [27], preschool education aims to foster children's overall development by integratively engaging the physical and motor, emotional, social, language, and cognitive dimensions. Food literacy fits fully within this perspective, as it simultaneously contributes to multiple developmental domains.

For example, food-related activities can support physical development (healthy lifestyle habits), language development (food-related vocabulary), social development (sharing and interactions), and cognitive development (classification and understanding of foods). Recent studies show that integrating activities such as gardening, cooking workshops, or thematic storytelling promotes interdisciplinary learning that is consistent with the educational aims of preschool education [28, 29, 30].

Daily routines, particularly meals and snacks, also constitute valuable context for the development of these competencies. They provide repeated opportunities for learning, socialization, and autonomy, allowing children to explore foods, express their preferences, and develop their relationship with their bodies and health [14, 17]. These situations fall within children's zone of proximal development, where guidance from competent adults supports the consolidation of learning [27].

Thus, the development of food literacy in preschool settings relies on a close articulation among the competencies to be developed, the educational contexts in which they are embedded (routines, transitions, structured activities, and free play), and the interventions of teachers and educators who support them on a daily basis.

2.3. Teaching Practices in Food Literacy: From Integration to Professional Adaptation

Teaching practices constitute a central lever in the development of food literacy in preschool settings. However, understanding these practices cannot be limited to identifying isolated activities or pedagogical strategies. Rather, they must be understood as complex, situated, and dynamic processes embedded within specific educational contexts and oriented toward learning objectives. From this perspective, Altet

(2002) [31] defines teaching practice as an “interactive, multidimensional, and goal-oriented process,” implying that it results from the constant articulation of different dimensions of professional activity.

This conception moves beyond a technicist view of teaching by considering it as a set of decisions, actions, and interactions constructed within situated contexts. Empirical research in preschool nutrition education highlights that teaching practices are embedded in complex frameworks simultaneously mobilizing pedagogical, relational, and organizational dimensions, particularly through activity planning, the scaffolding of interactions, and adaptation to educational contexts [28]. Thus, teachers mobilize an organized system of knowledge, instructional arrangements, and relational competencies to support learning.

In the field of food literacy, this complexity is even more pronounced because the targeted learning outcomes extend beyond individual behaviors to progressively encompass a broader understanding of food-related issues. To account for this complexity, Altet (2002) [31] proposes a model structured around three pillars—didactic, pedagogical, and relational (or psychosocial)—which can be mobilized as constitutive dimensions of teaching practices. These pillars do not constitute independent categories, but rather complementary dimensions that are enacted jointly in practice.

From an Education for Sustainable Development (ESD) perspective, these different dimensions are expected to interact in ways that connect classroom experiences with broader food-related, social, and environmental issues. The integration of these broader educational aims further complexifies teaching practice by requiring a pedagogy capable of linking everyday classroom experiences with global challenges [32, 33].

2.4. The Didactic Pillar: Mediating Food-Related Knowledge

The didactic pillar refers to the management of the knowledge involved in learning. From an ESD perspective, didactic transposition [34] must incorporate the various forms of knowledge associated with food literacy, including knowledge related to biodiversity, natural cycles, and social justice [35]. Teachers adapt and structure this knowledge in ways that are appropriate to children’s developmental level. As emphasized by Shulman (1986) [36], this requires Pedagogical Content Knowledge, enabling educators to translate food literacy concepts—including complex sustainability-related concepts—into experiences that are meaningful and understandable for young children [37]. This management of knowledge contributes to shaping the “enacted curriculum” and influences the representations children develop regarding food.

2.5. The Pedagogical Pillar: The Orchestration of Learning Mediations

The pedagogical pillar concerns intervention modalities and the mechanisms that support learning. ESD promotes participatory and action-oriented approaches [38]. Altet (2002) [31] refers here to “modes of mediation,” emphasizing the teacher’s active role in regulating learning activities. In preschool education, this pillar is embodied through experiential and play-based approaches (e.g., cooking workshops and gardening activities). These instructional arrangements align with Bruner’s (1983) [39] and Cloutier’s (2012) [40] concept of scaffolding, while also fostering learning through the resolution of concrete problems related to resource preservation [19]. Furthermore, the work of Gauthier et al. (1997) [41] underscores that this pedagogical dimension is inseparable from effective classroom management, which ensures the smooth implementation of meaningful learning situations.

2.6. The Relational or Psychosocial Pillar: Interactive Co-Activity

Finally, the relational pillar refers to the interactive dimension of teaching practice. It encompasses interactions between the teacher and the children, as well as the dynamics of the classroom group. Altet (2002) [31] emphasizes that teaching practice is above all a form of “human interaction,” in which teachers adjust their stance in response to children’s cognitive and socio-emotional reactions. In the context of food literacy, this is reflected in aspects such as the atmosphere during mealtimes or respect for children’s satiety cues. This dimension is now understood as a form of “co-activity” [42], in which professional action constitutes a continual response to the learner’s needs. In her recent work, Altet (2021) [43] further underscores that this relational dimension carries a strong ethical component, as teachers act as models of self-regulation and well-being. Within an ESD perspective, teachers also serve as models of values, fostering empathy toward living beings and a sense of collective responsibility [19].

2.7. The Teacher as a Professional of Integration and Adaptive Practice

One of the major contributions of Altet's (2002) [31] model lies in the interdependence of these pillars. Teachers emerge as “professionals of integration,” capable of negotiating in real time the constraints related to knowledge, action, and relationships. This competency relies on an ability to adapt within situated contexts, enabling teachers to regulate their pedagogical interventions in order to maintain a balance among the different dimensions of teaching practice.

Applied to food literacy in preschool education, this framework demonstrates that supporting the development of food-related competencies simultaneously involves selecting relevant content (didactic dimension), designing appropriate learning situations (pedagogical dimension), and creating a secure and supportive environment (relational dimension). This integrated approach makes it possible to move beyond a simple description of activities toward a nuanced understanding of the educational processes that foster meaningful and lasting learning. Professional adaptation thus emerges as a central competency for navigating complex situations, particularly those involving issues related to food, health, and the environment [37]. Figure 2 illustrates a model of teaching practices in food literacy based on Altet's (2002) [31] framework, enriched by the contributions of Bucheton (2009) [42] and articulated with the food literacy competencies proposed by Slater (2022) [23]. It highlights the interdependence of the didactic, pedagogical, and relational dimensions, as well as the central role of professional adaptation in the implementation of practices within preschool settings.

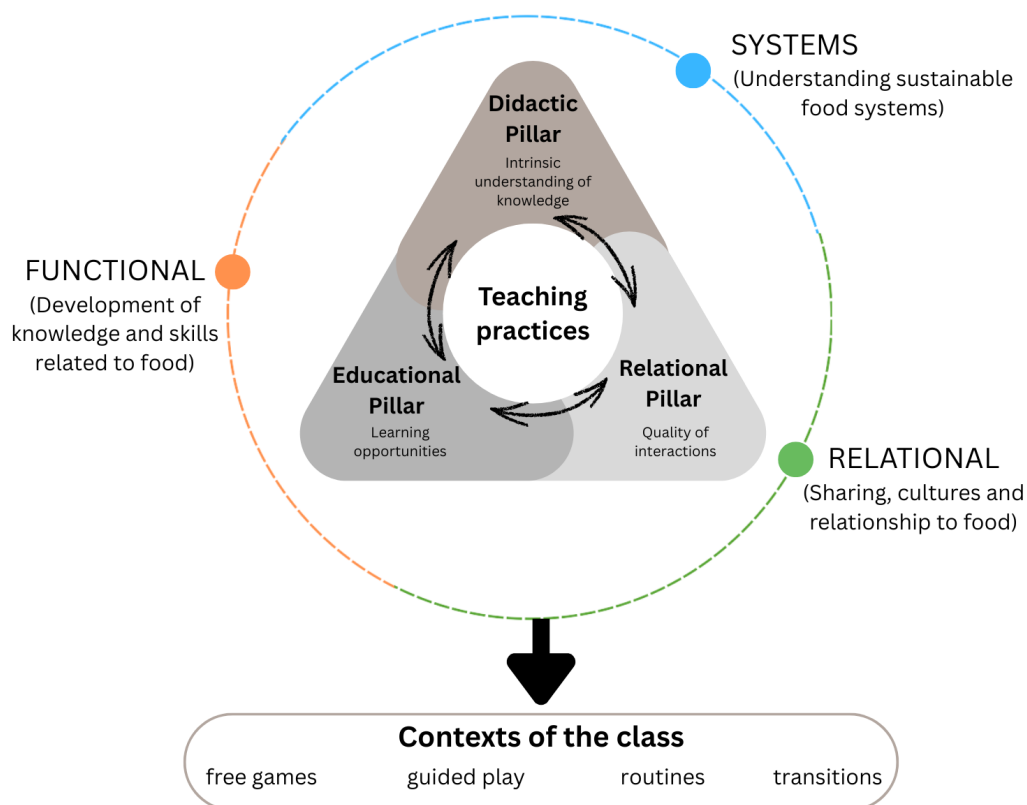


Figure 2. Teaching Practices to Support the Development of Food Literacy Competencies in Preschool Education

2.8. Relevance of the Literature Review

Despite the growing recognition of the importance of food literacy in early childhood, there are still very few systematic reviews specifically examining teaching practices implemented in preschool education settings [1, 13]. Existing studies often remain fragmented, limited to specific contexts, or focused on isolated interventions, without providing an integrated understanding of practices. Furthermore, the considerable variability in approaches across educational settings—attributable to the absence of clear pedagogical guidelines, limited specialized training, and uneven institutional support—makes it difficult to generalize findings and develop robust evidence-based recommendations [14, 44, 45].

This literature review therefore aims to provide a structured and critical overview of high-quality teaching practices related to food literacy in preschool education. It seeks to identify effective pedagogical approaches, favorable implementation conditions, and the observed outcomes on children's development, while also considering the play-based approach emphasized in the Quebec Preschool Education Cycle Program [27]. In this respect, examining teaching practices in this field extends beyond a strictly nutritional framework and aligns with the orientations of Education for Sustainable Development (ESD). It offers an opportunity to better understand how teaching mediations support the emergence of ecological awareness and citizenship from an early age [7, 19].

This undertaking presents clear scientific relevance by addressing a methodological and conceptual gap identified in current research. It also carries significant social relevance at a time when public health concerns, food inequities, and troubling dietary behaviors among young children call for coherent, early, and integrated educational actions embedded within children's living environments. By equipping preschool settings to structure interventions grounded in food literacy, this review will contribute to informing professional practices, guiding educational policies, and supporting an equitable, sustainable, and developmentally appropriate approach to health and environmental education from early childhood onward. Interest in teaching practice thus reinforces the recognition of food literacy as a key vector of ESD, contributing through education to the resilience of future food systems.

In light of these observations, this literature review seeks to answer the following question: What high-quality teaching practices support the development of food literacy in preschool education settings? This question reflects a desire to better understand how teachers, through their daily practices, contribute to the development of food-related competencies that are essential to young children's health, overall development, and capacity to act responsibly in response to sustainable development challenges.

3. Methodology

3.1. Article Selection / Inclusion and Exclusion Criteria

The literature review was conducted from May 2025 to January 2026. It enabled the research question to be addressed. This methodological approach was based on the PRISMA 2020 framework [46, 47] and followed a structured procedure designed to ensure scientific rigor, process transparency, and the reproducibility of results. The identification of four main concepts—preschool education, sustainable food literacy, nutrition education, and teaching practice—made it possible to establish the keywords used to conduct searches across the selected relevant databases (ERIC, Academic Search Complete, Education Source, MEDLINE, and APA PsycInfo).

3.2. Eligibility Criteria

The inclusion criteria were as follows: (a) peer-reviewed scientific articles, (b) published between 2010 and 2026, (c) written in French or English, and (d) addressing teaching practices that support the development of food literacy competencies among preschool-aged children (4 to 6 years old). Studies focusing solely on perceptions, opinions, or contexts outside preschool education (e.g., elementary school) were excluded, as were studies that did not explicitly describe teaching practices and the development of food literacy competencies.

The post-2010 period was selected to ensure the inclusion of the most recent research, within a context of significant curricular transformation in preschool education (e.g., play-based approaches, holistic child development, and 21st-century competencies).

With the support of a librarian from the Université du Québec à Trois-Rivières (Canada), the research assistant identified the descriptors used to address the selected concepts, validated the search methodology, and identified the relevant research databases to be used in this study. To accurately determine the descriptors to prioritize in the search strategies, both free vocabulary and controlled vocabulary derived from thesauri were used. Table 1 presents the search strategy employed, in both French and English, taking into account the keywords associated with the concepts under study.

Table 1. Search Strategies Used to Conduct the Literature Review.

	Search Strategies and Descriptors Used for Each Concept			
In French	<u>Concept 1:</u> Préscolaire, maternelle, éducation à la petite enfance	<u>Concept 2:</u> Littératie alimentaire durable, éducation à la santé, programmes éducatifs	<u>Concept 3:</u> Éducation nutritionnelle, nourriture, études alimentaires	<u>Concept 4:</u> Pratique enseignante, intervention précoce, programme éducatif, intervention en milieu scolaire
In English	<u>Concept 1:</u> Preschool, kindergarten, early childhood education, preschool education	<u>Concept 2:</u> Sustainable Food Literacy, health education and education programs	<u>Concept 3:</u> Nutrition, nutrition education and food studies	<u>Concept 4:</u> Teacher practice, early intervention, educational programs, educational intervention and school-based intervention

3.3. Selection and Data Extraction Process

The selection process was conducted in two stages: (1) screening of relevant titles and abstracts, followed by (2) full-text review of the selected articles. Two research assistants independently carried out this process, and any disagreements were resolved through consensus. Data extraction focused on the following information: authors, year, objective, type of play observed, nature of the intervention, and observed effects on children's development or play maturity.

3.4. Selection of Eligible Articles

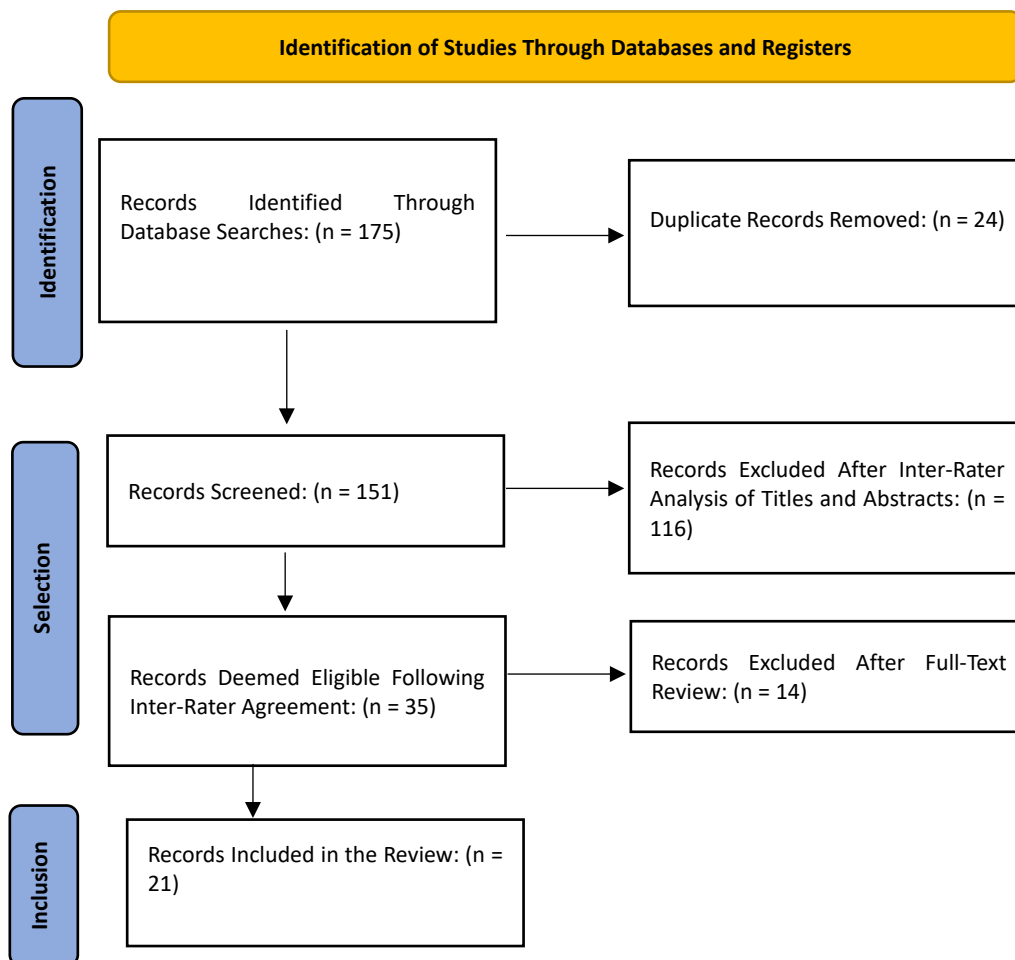


Figure 3. Final Selection of Studies According to the PRISMA 2020 Framework [46, 47].

The database search identified 175 articles; among these, 24 duplicates were removed, resulting in a total of 151 articles. The retained articles met the following inclusion criteria: (1) written in English or French; (2) addressing teaching practices related to food literacy; (3) focused on preschool education; and (4) conducted within a school context. Articles were excluded according to the following criteria: (1) language other than English or French; (2) absence of teaching practices; (3) populations other than regular preschool classrooms for 4- and 5-year-old children; (4) contexts outside the school setting; and (5) topics unrelated to the research focus.

Following the review of titles and abstracts, and after reaching 100% agreement among the researcher and the two research assistants, 35 articles were selected for full-text review to ensure their relevance to the topic and compliance with the inclusion and exclusion criteria. The full-text review enabled an initial screening process. Each retained article addressed the four main concepts (preschool education, sustainable food literacy, nutrition education, and teaching practice). Articles that did not correspond to these concepts were classified according to the exclusion criteria. A total of 21 articles were retained and analyzed using a data extraction grid. Figure 3 presents the final selection of articles.

3.5. Analysis

Two grids were developed to support the analysis of the selected articles. The first was designed for the systematic extraction of descriptive data, including the country in which the study was conducted, the number of participants, the type and design of the study, the food literacy programs used, and the study's main findings. The second grid was used for the qualitative analysis of the content.

A thematic analysis was conducted by combining deductive and inductive coding, as recommended by Fereday and Muir-Cochrane (2006) [48] and Kiger and Varpio (2020) [49]. This strategy makes it possible to structure the analysis using a predefined conceptual framework while also allowing meaningful themes to emerge from the data. First, deductive coding was applied based on the intervention categories defined in the conceptual framework, namely Slater's (2022) [23] food literacy competencies. Subsequently, inductive coding enabled the emergence of subthemes within these categories, particularly regarding teaching practices, interventions implemented to support parents, and classroom contexts.

The coding process was conducted manually by two members of the research team, independently and then collaboratively, using a shared coding table. This process helped ensure the consistency of the analysis and highlighted the teaching practices aligned with the objective of the review.

4. Results

This section presents the findings related to the research objective. First, the articles identified that met the inclusion criteria of this literature review will be described according to their modalities (programs/interventions) and implementation processes. Subsequently, the findings from the reviewed articles will be presented according to the teaching practices used to support food literacy competencies, drawing on the frameworks proposed by Altet (2002) [31] and Slater (2022) [23]. The following table provides a synthesis of the analyzed studies according to the pedagogical objectives pursued, the implementation contexts, and the types of teaching practices mobilized in relation to the food literacy competencies proposed by Slater (2022) [23].

Table 2. Synthesis of the Selected Articles.

Reference	Pedagogical objective	Context	Type of practice [31]	Slater's (2022) [23] Competencies
[50]	Raise awareness of eating behaviors and physical activity	Structured activities + home environment	Pedagogical (narrative mediation + activities) + Relational (parent-child connection)	Functional + Relational
[8]	Increase vegetable consumption	Structured activities + classroom	Pedagogical (multimodal, experiential) + Didactic (nutritional content)	Functional (predominant) + Relational

integration				
[51]	Promote acceptance of vegetables	Circle time + routines + home environment	Pedagogical (reading + tasting) + Relational (interaction, family involvement)	Functional + Relational (+ emerging Systemic)
[52]	Develop healthy habits	Activities + gardening + home environment	Pedagogical (multilevel) + Didactic + Relational	Functional + Relational + Systemic
[28]	Integrate food and learning	Routines + structured activities	Didactic (cross-disciplinary integration) + Pedagogical	Functional (predominant) + Systemic (limited)
[29]	Increase fruit and vegetable consumption	Structured activities	Pedagogical (sensory-based)	Functional + Relational
[53]	Develop enjoyment and engagement with food	Activities + cooking + home environment	Pedagogical (play-based, experiential) + Relational	Functional + Relational
[54]	Modify health behaviors	Activities + home environment	Pedagogical (multicomponent) + Relational (family involvement)	Functional + Relational
[55]	Develop healthy lifestyle habits	Activities + routines	Didactic + Pedagogical (structured program)	Functional + Relational
[56]	Promote openness toward fruits	Structured activities	Pedagogical (sensory-based + narrative) + Relational	Functional + Relational
[57]	Develop knowledge and habits	Activities + home environment	Didactic (lessons) + Pedagogical	Functional
[58]	Increase consumption of healthy foods	Routines + tasting activities	Relational (verbal scaffolding) + Pedagogical	Functional + Relational
[11]	Develop knowledge and habits	Activities + home environment	Didactic + Pedagogical (multicomponent)	Functional + Relational
[59]	Develop food awareness	Activities + family	Pedagogical + Relational + Didactic	Functional + Relational +

		involvement		Systemic
[21]	Increase willingness to consume fruits and vegetables	Structured activities	Pedagogical (experiential)	Functional + Relational
[60]	Improve knowledge and physical fitness	Structured activities	Didactic + Pedagogical	Functional + Relational
[61]	Train teachers	Structured activities	Didactic (training) + Pedagogical	Functional (indirect)
[18]	Increase willingness to try fruits and vegetables	Activities + gardening + learning centers	Pedagogical (gardening) + Didactic	Functional + Relational + Systemic
[62]	Understand mealtime practices	Routines	Relational (classroom climate + organization)	Functional + Relational
[14]	Describe verbal interactions	Routines (mealtimes)	Relational (verbal interactions)	Functional + Relational
[63]	Increase fruit and vegetable consumption	Structured activities	Didactic (curriculum-based) + Pedagogical	Functional + Relational

The analysis of the selected studies highlights that teaching practices supporting the development of food literacy in preschool settings are predominantly grounded in an experiential, teacher-directed, and behavior-focused pedagogical approach, with secondary mobilization of relational dimensions and limited integration of systemic dimensions. The findings reveal strong regularities in the types of practices, implementation contexts, and competencies mobilized, while also shedding light on certain tensions and limitations within the field.

4.1. Predominance of Experiential Pedagogical Mediations in the Structuring of Teaching Practices

The analysis of the corpus reveals that teaching practices related to food literacy in preschool education are primarily grounded in Altet's (2002) [31] pedagogical pillar. This structuring relies heavily on the use of experiential approaches centered on sensory and motor action, such as tasting, manipulation, and repeated exposure, which together constitute the functional core of the interventions identified in the reviewed studies.

Findings from the experimental and quasi-experimental studies converge in demonstrating that these modes of mediation promote food acceptance and consumption [8, 21, 29, 55, 63]. These approaches reflect a logic of embodied learning in which the teacher, acting as an organizer of learning situations, regulates children's activity through direct scaffolding in relation to the learning object.

However, the effectiveness of this pedagogical pillar is inseparable from a narrowing of the didactic scope. The content mobilized is largely crystallized around nutritional and behavioral knowledge (recognition, preferences, consumption), thereby limiting the reach of didactic transposition to its functional dimension. For example, some preschool educational interventions, although effective in modifying dietary habits, remain centered on the acquisition of healthy behaviors (nutrition, physical activity) without necessarily fostering an in-depth understanding of food systems or their determinants [54]. Experiential mediations thus function more as vehicles for restricted behavioral objectives than as levers for conceptualization or systems thinking.

Finally, although the emergence of systemic approaches such as gardening or "seed-to-plate" projects [18, 52] suggests a broader didactic opening, these initiatives remain marginal. Yet these more holistic practices are essential for anchoring food literacy within ESD, as they move beyond the narrow framework of individual consumption to explore the sustainability of production cycles [20]. The

articulation between mediations and content therefore remains largely dependent on a pragmatic objective, privileging the modification of immediate habits over a comprehensive understanding of food systems. This “didactic narrowness” limits the transition from simple nutrition education toward a genuine education for sustainable food citizenship beginning in preschool education.

4.2. Pedagogical Mediation and Symbolic Devices: The Relational Pillar in Support of Learning

Beyond strictly sensory approaches, the findings highlight a close articulation between the pedagogical and relational pillars, achieved through the systematic use of narrative, symbolic, and play-based supports. This synergy demonstrates that mediation is not limited to the material organization of activities, but also encompasses the child’s relationship to knowledge, mediated through social interactions and shared representations.

The use of stories, characters, and dramatized scenarios emerges as a strategic lever for introducing foods and structuring learning situations [50, 51, 53, 56]. By embedding food within a symbolic universe, these approaches foster processes of identification and projection that transform raw sensory experience into an experience that is socially and emotionally meaningful. Moreover, these narratives constitute valuable vehicles for introducing early notions of sustainability by dramatizing the food life cycle or interdependence with nature, thereby facilitating a systems-based understanding adapted to preschool children’s cognitive capacities [7, 19].

This symbolic mediation fully mobilizes the interactional dimensions of learning [31]. It also aligns with health models in which repeated interactions and social practices contribute to the construction of lasting representations of food and health from an early age [59]. Collective sensory and culinary activities, when supported by verbal exchanges and forms of cooperation, contribute to the social co-construction of meaning [18, 29, 50, 53, 56]. Learning therefore does not rely solely on individual cognitive processing but is embedded within a group dynamic in which imitation and peer interpretation validate children’s relationship with food. Through this co-activity, teachers establish social norms related to responsible consumption, such as equitable sharing and the valuing of resources, thereby laying the foundations for an ethic of sustainability within the classroom [19].

Ultimately, the relational pillar does not emerge as an autonomous end in itself but rather functions as a lever supporting pedagogical mediations. It secures children’s engagement and reinforces the effectiveness of learning situations by transforming food-related acts into opportunities for social and civic participation. This relational dimension proves essential for anchoring sustainability competencies within children’s affective experiences, a *sine qua non* condition for lasting behavioral change [24].

4.3. Teaching Interactions: A Space of Tension under Didactic Constraints

Daily interactions constitute the site where the three pillars of Altet’s (2002) [31] model are enacted, revealing the complexity of their articulation in real-life situations. These exchanges simultaneously relate to the relational pillar, through their affective dimension, and to the pedagogical pillar, as modalities of scaffolding and regulation of activity.

The findings highlight the effectiveness of supportive practices—such as modeling, descriptive verbalization, and non-coercive encouragement—in fostering children’s engagement and food exploration [14, 58]. Conversely, constraining strategies centered on behavioral control tend to orient activity toward compliance at the expense of autonomy [62]. This coexistence reflects a structural tension: didactic requirements (achieving nutritional objectives) frequently come into conflict with relational aims (respecting enjoyment and engagement). Hybrid strategies, such as the “no thank you bite,” illustrate attempts to reconcile forced exposure with the preservation of the relational bond [28]. Furthermore, one intervention study demonstrates that teacher training constitutes an important lever for improving the quality of educational interactions, particularly by fostering the integration of supportive practices and the development of children’s self-regulation and decision-making competencies [55].

However, the predominance of immediate objectives (tasting and consuming food) limits the mobilization of the didactic pillar in its reflective dimension. The literature indicates that interactions tend to crystallize around encouraging children to try foods rather than around the co-construction of reasoning related to food [14, 28, 58]. The integration of complex content, such as food systems, product life cycles, or food processing, therefore, remains marginal and difficult to operationalize in classroom settings [18, 28]. This lack of scaffolding around systemic issues deprives children of opportunities to develop anticipatory thinking, which has been identified as a key competency for understanding the long-

term environmental impact of food practices [7, 24].

Overall, these findings converge toward a diagnosis of imbalance: although teaching practices jointly mobilize pedagogical and relational dimensions, their didactic grounding remains subordinated to behavioral objectives. This orientation privileges the functional dimension of food literacy [8, 11, 29] and consequently limits the development of a comprehensive and integrated understanding of food-related issues. This didactic imbalance suggests that current interactions, while effective for the immediate regulation of mealtime behaviors, still struggle to become genuine levers for Education for Sustainable Development, due to the absence of explicit mediation regarding the interconnections between food choices and resource preservation [20].

4.4. A Predominance of Structured Activities and an Underutilization of Informal Contexts

The analysis of pedagogical contexts reveals a marked predominance of structured activities, defined as learning situations planned and guided by adults with explicit objectives. This cross-cutting trend is reflected in formal lessons, educational workshops, and standardized curricular sequences [8, 11, 57, 60, 63]. This rigid structuring persists regardless of the modalities employed, whether sensory exploration [29], narrative-based approaches [51, 56], or culinary activities [53]. The activity remains teacher-led, a centrality justified by the pursuit of implementation fidelity and the achievement of measurable objectives [28, 61]. This formalism situates food literacy within a logic of explicit instruction that privileges behavioral outcomes at the expense of the reflective dimension of the didactic pillar [31]. Such a directive approach limits the emergence of strategic sustainability competencies, which require learners to independently explore alternatives and exercise critical judgment regarding food-related issues [22].

At the same time, daily routines related to meals and snacks remain underutilized despite their potential as authentic and socially grounded learning contexts [14, 58, 62]. Although family-style meal service promotes modeling and interaction [62], these moments are largely reduced to behavioral reinforcement functions, such as encouraging children to taste foods or regulating consumption. Yet these real-life contexts constitute privileged laboratories for observing and acting upon food waste or discussing the seasonality of products, thereby transforming a biological routine into an act of conscious eco-citizenship [7, 19]. Their use as spaces for conceptual or systemic learning remains marginal in the observed practices.

Finally, informal contexts, including free play and transitional moments, are almost entirely absent from the reviewed corpus. This gap appears paradoxical in preschool education, where play constitutes a major developmental vector. When play is included, it is often redirected toward structured formats of classification or association rather than being left to spontaneous symbolic exploration [63]. This absence is particularly significant given the central role of free play within preschool pedagogical approaches. The lack of symbolic play related to food limits children's ability to "reenact" natural cycles (gardening, transforming, composting) and to internalize environmental preservation values in a self-determined manner [32]. This structuring also reflects educational models in which health programs are institutionally planned and implemented, often through formal interventions involving teachers and parents, while leaving less room for informal learning or children's spontaneous initiatives [59].

Taken together, these findings indicate that food literacy is primarily approached as an object of formal instruction requiring explicit planning and guidance. This orientation contributes to privileging structured and observable learning outcomes while limiting the use of informal contexts that could support more spontaneous, situated, and socially constructed forms of learning. By privileging didactic "ready-made thinking," current teaching practices struggle to provide children with the space necessary to develop sustainable food literacy, which depends as much on affective and informal engagement as on technical knowledge [20].

4.5. Structural Analysis of Teaching Practices: From Pedagogical Integration to Competency Imbalance

The analysis of teaching practices in preschool settings, examined through the conceptual framework of food literacy [23], reveals an asymmetrical mobilization of its dimensions. This imbalance is characterized by a predominance of the functional dimension, an instrumentalization of the relational dimension, and a marked underdevelopment of the systemic dimension.

4.5.1. The Predominance of Functional Competency

Functional competency saturates the pedagogical space and constitutes the primary structuring axis

of the interventions. It is manifested through practices aimed at the acquisition of nutritional knowledge and the development of behaviors considered beneficial to health [8, 29]. From Altet's (2002) [31] perspective, this corresponds to a didactic pillar centered on the transposition of biomedical knowledge, in which teachers transform health-related information into operational guidelines concerning vegetable consumption or dietary diversification. Food literacy is thus treated as an applied form of nutrition education, centered on the individual and on immediate food-related performance.

4.5.2. *The Instrumentalization of the Relational Dimension*

Although present, the relational or psychosocial competency [31] is rarely treated as an educational aim in itself. Rather, it functions as a pedagogical lever serving functional objectives. While narrative and play-based approaches (e.g., food-related storytelling) [50, 51] help foster a positive climate, they are primarily mobilized to reduce food neophobia and facilitate food acceptance. Slater's (2022) [23] model, which emphasizes pleasure, identity, and social belonging, is therefore only partially addressed. Social interactions are used to encourage children to eat, without becoming the object of explicit reflection on food as a cultural or symbolic phenomenon. As a result, teaching practice is reduced to the management of food-related order rather than to the co-construction of meaning.

4.5.3. *The Underdevelopment of the Systemic and Critical Perspective*

In contrast, the systemic competency of food literacy remains marginal. This dimension, defined by Slater (2022) [23] as a comprehensive understanding of systems including food origins, the environment, and social justice, is rarely addressed conceptually. Although certain "seed-to-plate" activities [18, 52] introduce elements of understanding, these remain peripheral and are often intended to reinforce food acceptance rather than develop critical awareness. This observation is corroborated by empirical findings on verbal interactions [14] and by teachers' difficulties in integrating food-related topics into interdisciplinary or conceptual learning experiences [28]. Teaching practice, described by Bucheton (2009) [42] as a "multi-agenda," appears here to encounter difficulties, as the agenda of classroom management and behavioral scaffolding takes precedence over that of weaving broader meaning.

In conclusion, the current architecture of teaching practices reveals a structural imbalance. By privileging individual and behavioral competencies, preschool interventions obscure the critical and situated dimension advocated by Slater (2022) [23]. This reductionism limits the educational scope of teaching practice because, while it equips children to make immediate choices, it hinders the development of a holistic understanding of food necessary to move from the status of passive consumer to that of a conscious actor within one's food environment. This underdevelopment of the systemic perspective suggests that, without an explicit didactic intention linked to sustainable development, food literacy in preschool education remains confined to an individual health approach, thereby failing to realize its potential as a lever for planetary health [20]. The following table presents a synthesis of the findings by articulating teaching practices according to Altet's (2002) [31] model, food literacy competencies [23], sustainability learning objectives through the presence of systemic competency [19], and the implementation contexts observed in the studies.

Table 3. Synthesis of Teaching Practices, Food Literacy Competencies, and Classroom Contexts.

Teaching Practices [31]	Food Literacy Competencies [23]	Classroom Contexts	References
Pedagogical – experiential approaches (tasting, sensory exploration, manipulation)	Functional (predominant) + Relational	Structured activities (workshops, lessons)	[8,21, 29, 55, 63]
Pedagogical – play-based and narrative mediations (stories, guided games, characters)	Relational + Functional	Structured activities (workshops)	[50, 51, 53, 54, 56]
Pedagogical – culinary and participatory activities	Functional + Relational (+ limited Systemic)	Structured activities + home environment	[18, 50, 53]

Didactic – structured instruction (nutritional content, lessons)	Functional	Structured activities (curriculum, programs)	[11, 57, 59, 60, 63]
Didactic + systemic (emerging) (gardening, “seed-to-plate” approaches)	Systemic + Functional	Structured activities + outdoor environments	[18, 52]
Relational – supportive interactions (modeling, encouragement, verbalization)	Relational + Functional	Routines (mealtimes, snacks)	[14, 58]
Relational – constraining interactions (pressure, control)	Functional (behavior- centered)	Routines (mealtimes)	[14, 62]
Pedagogical + Didactic – multicomponent programs	Functional + Relational (+ marginal Systemic)	Structured activities + home environment	[11, 52, 54, 59]
Pedagogical organization (teacher-directed management)	Functional (predominant)	Structured activities (highly structured)	[28, 59, 61]
Informal contexts minimally mobilized (free play, transitions)	Relational (potential, underutilized)	Free play (largely absent)	[28, 63]

5. Discussion

The literature review highlights two main findings regarding food literacy practices in preschool education. First, although the three competencies proposed by Slater (2022) [23]—functional, relational, and systemic—are mobilized to varying degrees, certain dimensions remain insufficiently addressed or are approached only implicitly. Second, few studies take into account the diversity of pedagogical contexts specific to preschool education, such as free play, routines, or transitions, thereby limiting the educational scope of the documented interventions.

5.1. A Practice Centered on Immediate Action Rather Than on Meaning-Making

The first major finding highlights that teaching practices are largely dominated by the pedagogical pillar [31], meaning that teachers give almost exclusive priority to the organization of the activity itself (the “doing”). There is a strong focus on concrete workshops such as tasting or manipulation activities, with the aim of obtaining a visible and immediate outcome: having the child accept trying a new food. This tendency to transform food education into a series of technical exercises can be explained by what researchers refer to as the “school form” [64], whereby schools tend to break knowledge down into simple, assessable tasks. As Benn and Carlsson (2014) [65] point out, teachers often feel more legitimate in the role of transmitters of health-related instructions than in that of mediators of broader forms of knowledge.

This imbalance considerably limits what Bucheton (2009) [42] refers to as weaving. Weaving is an essential professional practice consisting of creating connections, generating meaning, and linking the immediate activity to other forms of knowledge or to the child’s real-life experiences. From an Education for Sustainable Development (ESD) perspective, such weaving is essential in helping children understand that what is on their plate is connected to a global ecosystem [19]. For example, during snack time, a teacher engaging in weaving would not simply say, “Eat your apple, it’s healthy” (a managerial stance). Instead, the teacher might ask, “Do you remember the color of the apple tree blossoms we saw in the book yesterday?” or “Do you know what happens to the apple core after we eat it and how it can help nourish the soil?” In doing so, the teacher weaves a connection between the act of eating, a previous reading activity, and the life cycle of matter—a key competency in systems thinking for sustainability

[22]. At present, the findings indicate that teachers struggle to engage in such weaving because they are often preoccupied with behavior management and compliance with nutritional guidelines.

Moreover, this focus on immediate outcomes brings teaching practices closer to prevention (modifying behavior) than to genuine education (developing critical thinking). According to Velardo (2015) [66], many school-based interventions remain superficial because they treat food as a technical object to be consumed rather than as a cultural and environmental object to be explored. By using the relational connection with the child (the relational pillar) solely to encourage tasting, educators overlook what Vacher (2024) [67] describes as the analysis of the relationship to the object. As a result, there is a risk of raising children who comply with dietary rules without understanding their deeper implications, thereby hindering the development of comprehensive and responsible food literacy grounded in contemporary climate challenges [7].

5.2. An Uneven Development of Food Literacy Competencies

The analysis of the reviewed studies reveals a marked predominance of practices aimed at developing functional competencies and, to a lesser extent, relational competencies, to the detriment of systemic competencies. This tendency is reflected in the emphasis placed on food recognition, participation in tasting activities, and the identification of the effects of food on health [14, 50, 54]. The activities primarily promote concrete and immediate forms of learning related to food consumption, preparation, and verbalization.

In contrast, few interventions explicitly address the systemic dimensions of food literacy, such as food origins, sustainability issues, or the sociocultural and economic influences shaping food choices [11, 58]. This “systemic underdevelopment” is problematic because it is precisely within this dimension that the key levers of Education for Sustainable Development (ESD) are located. Without an understanding of the origins and impacts of food, children cannot develop normative or strategic competencies in relation to food-related crises [19, 22]. This observation echoes other critical analyses, particularly that of Slater et al. (2018) [6], which highlights that food literacy is often reduced to a series of individual practical skills without being connected to a critical understanding of the global food system. The Food Literacy Progression framework developed in Manitoba further emphasizes that systemic competency is essential for emancipatory food education but requires structured and intentional support from educational practitioners [68, 69].

Several factors may explain this limited mobilization of systemic competency. On the one hand, teachers’ lack of training regarding the more complex issues related to food systems limits their ability to integrate these concepts into their pedagogy [56]. Integrating sustainable development requires teachers to move from the role of nutrition expert to that of facilitator of broader critical reflection, a complex transition without appropriate didactic support [37]. On the other hand, the pedagogical resources currently available still focus predominantly on sensory and behavioral dimensions [70], to the detriment of the social, environmental, and political dimensions of food.

To strengthen systemic competencies, several studies advocate for a cross-curricular approach integrating discussions about food origins, the environment, and food culture beginning in preschool education [28, 51]. This requires training teachers to recognize the links between food and sustainability, while equipping them to provide educational experiences that connect food to production environments, ethical choices, and food justice. Such an approach would align food literacy with UNESCO’s learning objectives for SDG 2 (“Zero Hunger”) and SDG 12 (“Responsible Consumption and Production”) [19].

5.3. Limited Consideration of Preschool-Specific Pedagogical Contexts

Although several of the reviewed studies highlight relevant pedagogical practices for supporting food literacy, these practices often remain centered on structured activities or targeted interventions, without explicit grounding in the educational contexts specific to preschool classrooms. Yet, within the framework of the Quebec Preschool Education Cycle Program [27], learning among preschool-aged children takes place within a holistic environment in which free play, daily routines, exploration centers, and spontaneous social interactions are recognized as fundamental learning contexts.

However, the literature review reveals that teaching practices related to food literacy are primarily documented during structured workshops or planned sessions, often associated with specific research projects [50, 54, 55]. These approaches overlook spaces that are nonetheless highly significant for preschool children, such as symbolic play, play centers, or peer interactions during mealtimes, all of

which provide authentic opportunities to mobilize the functional, relational, and systemic competencies of food literacy. Yet Education for Sustainable Development (ESD) in preschool education becomes more effective when it is “situated” within children’s everyday experiences [20]. Free play centered around food (e.g., a local market or an imaginary garden) could enable children to explore sustainability concepts in authentic and non-coercive ways.

Recent studies emphasize that symbolic play constitutes an important vector of holistic child development, and that teachers’ intentional engagement within this type of play can strengthen learning by making it meaningful [71]. In the context of food literacy, this could take the form of play scenarios in which children run a restaurant, pretend to shop for groceries, or simulate meal preparation. These contexts provide meaningful opportunities to mobilize food-related knowledge, express preferences, negotiate social roles, and symbolize the relationship between food and health.

Nevertheless, it must be acknowledged that few of the reviewed studies address the diversity of natural preschool classroom contexts—such as free play, transitions, or spontaneous interactions—as spaces for the development of food literacy. This theoretical and methodological gap has also been identified in studies focusing more broadly on educational practices in preschool education [72, 73]. These studies call for stronger alignment between pedagogical interventions and the didactic frameworks specific to early childhood education, taking into account developmental approaches and children’s active construction of knowledge.

Thus, in order to make food literacy interventions more consistent with the school experiences of children aged 4 to 6 years, it is important to better integrate food literacy into the multiple learning spaces offered within preschool classrooms, particularly through pedagogical support during play, manipulation and imitation centers, and shared routines. Such integration would not only promote a more balanced development of the competencies proposed by Slater (2022) [23] but would also align with the holistic development aims promoted by the Quebec Ministry of Education (2023) [27], while contributing to the development of early eco-citizenship, a key pillar of sustainable health for future generations.

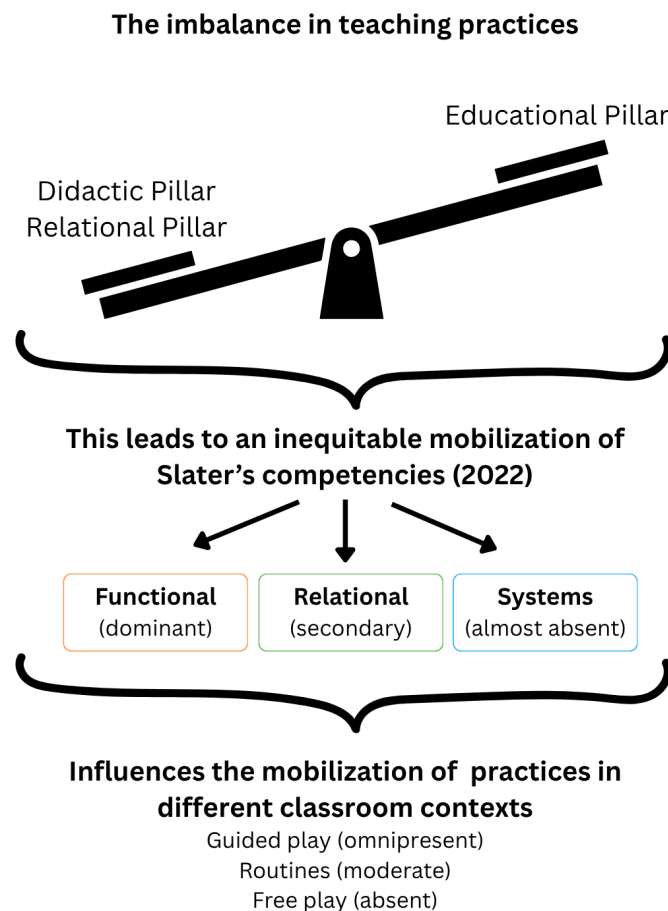


Figure 4. Imbalances Observed in Teaching Practices Related to Food Literacy in Preschool Education.

Figure 4 illustrates the imbalances observed in teaching practices related to food literacy in preschool education. It highlights the predominance of the pedagogical pillar, the limited mobilization of the didactic and relational pillars, and the uneven development of food literacy competencies, characterized by the dominance of the functional dimension and the marginalization of the systemic dimension. It also underscores the limited consideration given to informal contexts, particularly free play, which remains a blind spot within the field.

5.4. Limitations of the Literature Review

Although comprehensive in its coverage of the available literature on food literacy in preschool education, this review presents certain limitations. First, several of the studies reviewed originate from specific North American contexts (e.g., Head Start programs), which may limit the transferability of the findings to the Quebec context. Second, the methodological diversity and variability of the samples sometimes make direct comparisons between results difficult. Finally, the identified studies often describe the effects of short-term planned interventions without longitudinal follow-up, thereby limiting the assessment of the sustained impact of teaching practices on the development of food literacy competencies.

6. Conclusion

This literature review highlights a structural imbalance in the teaching practices that support the development of food literacy in preschool education settings. The findings show that these practices, predominantly centered on teacher-directed and experiential pedagogical approaches, support the three dimensions of food literacy defined by Slater (2022) [23] in unequal ways. While functional competencies and, to a lesser extent, relational competencies are frequently mobilized, the systemic dimension remains largely marginal—or even absent—from the documented interventions. This configuration reflects a dominant conception of food education as a set of individual skills oriented toward observable behaviors, to the detriment of a critical, cultural, and contextualized approach to food [2, 5]. This observation underscores a disconnect between current practices and the ambitions of Education for Sustainable Development (ESD), which requires a comprehensive understanding of life cycles and systemic interdependencies [19].

This imbalance cannot be dissociated from the ways in which teaching practices are designed and implemented. The predominance of structured activities, often planned outside the natural contexts of the classroom, reflects a formal approach to food education centered on controlling learning situations and achieving measurable objectives. Yet this structuring limits the integration of the more complex dimensions of food literacy, particularly those related to understanding food systems and constructing meaning. By privileging immediate outcomes (food consumption) over reflective processes, these practices struggle to cultivate anticipatory and critical thinking, competencies that are nevertheless essential for preparing citizens capable of navigating the complexity of contemporary food-related issues [7, 22].

Furthermore, although the Quebec curriculum recognizes the central role of play, routines, and spontaneous interactions in children's holistic development [27], these contexts remain largely underutilized in the reviewed practices. The limited consideration given to everyday educational contexts, including free play, transitions, and informal situations, restricts opportunities for situated and socially constructed learning, which are essential for the development of integrated competencies [72, 73]. Yet integrating food literacy into these authentic moments of daily life would make it possible to anchor sustainability values—such as respect for resources and waste reduction—within children's developing identities [20].

Thus, beyond a mere lack of diversity in the proposed activities, this review highlights a lack of fully articulated teaching practices capable of coherently integrating the didactic, pedagogical, and relational dimensions [31], while simultaneously supporting the full range of food literacy competencies. It therefore appears necessary to develop more integrated educational approaches grounded in authentic preschool contexts and fostering a comprehensive, critical, and situated understanding of food.

Such an orientation implies the need to better document teachers' actual practices, to support their training regarding the systemic dimensions of food, and to design interventions grounded in interdisciplinary and developmental perspectives. In this regard, strengthening the quality and coherence of teaching practices constitutes a central lever for promoting equitable food education, sustainable health,

and an eco-citizenship consciousness rooted in children's everyday experiences from early childhood onward.

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