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Research

Evaluating the Effectiveness of the "Food Literacy Program" Designed for a Sustainable Future

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Abstract:

This study was carried out to evaluate the development, implementation, and effectiveness of the "Food Literacy Program" which was designed using the Morrison, Ross, and Kemp instructional design model and includes the principles of sustainable and ethical food consumption. The "Food Literacy Program", designed for this study, was implemented with 26 students for 12 lesson hours. In order to examine the changes in students' knowledge, skills, and awareness about food literacy, a single-group pre-test-post-test quasi-experimental design was selected. For the analysis of the data, the pre-test and post-test scores, which were normally distributed, were subjected to a t-test. The results of the analyses indicated that there was a significant difference between the post-test and pre-test scores of the students. According to these results, it can be said that the "Food Literacy Program" which was designed by the researchers in accordance with the Morrison, Ross and Kemp instructional design model, is effective in providing students with food literacy behaviors. In the light of these findings, it is suggested that the "Food Literacy Program" designed for primary school students can be designed for other education levels and that food literacy programs should be included in the education system as elective courses.

Keywords: Food literacy, instructional program, program development, sustainability, ethical food consumption

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INTRODUCTION

Food systems are one of the triggers of climate change and increasing health problems and the effects of which are felt on a global scale (Smith et al., 2022). Despite 735 million people suffering from hunger in the world, 1.8 billion people, which is approximately 20% of the world's population, are overweight due to excessive calorie intake. This situation is no different in Turkey. 17% of the country's population is defined as obese (Türkiye Ministry of Health, 2024; UNICEF Türkiye, 2024; WHO, 2024). Obesity, which is considered one of the causes of life-threatening diseases such as type 2 diabetes, cardiovascular diseases, and many types of cancer (Jin et al., 2023), is closely related to eating habits (Honda et al., 2020). Irregular meals, lack of vegetable consumption, and frequent snacking have been identified as causes of obesity (Lim & Lee, 2023; Mendoza et al., 2020). As a result, adopting healthy eating habits plays an important role in preventing obesity (Bounihi et al., 2023; Honda et al., 2020; Onofriescu et al., 2025). To secure the future of both people and the planet, sustainable development plans should be carefully monitored, and food literacy skills that offer a holistic perspective in food consumption preferences should provide people.

Sustainable development, which has sociological, economic and environmental dimensions, represents not only the activities carried out for the protection of natural resources, but also a system in which people can contribute even through their food preferences (Şahin, 2024). The concept of "sustainability" which aims to meet the needs of today's people without compromising the ability of future generations to meet their own needs (Ceyhun Sezgin et al., 2023), serves the aforementioned perspective. Rachel Carson's 1962 book Silent Spring written, the permanent damage caused by human activities to nature was expressed, and in 1987, the concept of sustainability was announced to the whole world by the official authorities in the Bruntland Report (Mızık & Avdan, 2020). The purpose of sustainable development is to remind countries that they are using resources that belong to present and future generations when setting their social and economic development goals in order to prevent irreversible environmental problems (Presidency of Strategy and Budget, 2024). Sustainable development is directly related to food consumption. Food production and consumption cause many sustainability issues, such as the use of natural resources, environmental pollution, climate change, and biodiversity loss. In addition, healthy and balanced nutrition is critical for economic development and public health (Fanzo, 2019; Kumar et al., 2022; Mathys et al., 2022). The United Nations' goals of “Ending Hunger” and “Responsible Consumption and Production” prioritize the sustainability of food systems and healthy nutrition (Mensah et al., 2023). However, today's food consumption habits and production methods pose significant obstacles to achieving these goals (Fanzo, 2019; Nichifor et al., 2025). To secure the future of both people and the planet, sustainable development plans must be carefully monitored, and food literacy skills that offer a holistic perspective on food consumption choices must be imparted to people.

There is a change in the paradigm regarding food. This change has led to an approach in which people are not only focused on their body mass index, but also take into account social, cultural and environmental conditions in their food preferences in the name of healthy eating (Block et al., 2011). People could not remain silent in order to protect nature, which is destroyed by the ever-expanding agricultural lands, increasing irrigation needs, and fossil fuel residues used for food transportation to feed the increasing human population. For this purpose, the World Wide Fund for Nature (WWF) has presented principles on nutrition, with its Livewell for Low Impact Food in Europe (LIFE) project. According to these principles, less meat should be consumed, and more vegetables and fruits should be consumed instead. Wasted food should be reduced by expanding the range of nutrients. Certified foods should be preferred, and processed foods containing high sugar, salt, and fat should be avoided (WWF, 2014). At this point, food literacy skills come into play enabling people to regulate their food preferences and diets with a holistic approach. Food literacy is a concept that was first defined by Vidgen and Gallegos (2014). The aforementioned authors described food literacy as a set of knowledge, skills and behaviors that people should have while meeting their food needs. Food literacy encompasses not only nutritional knowledge, but also practical skills such as budget management, shopping, meal preparation, and ethical food choices (Begley et al., 2018; Poelman et al., 2018). The foundation for lifelong healthy eating habits depends on food literacy skills acquired during childhood and adolescence (Philippe et al., 2023). Yetersiz gıda okuryazarlığı bilgisi, sağlıksız beslenme alışkanlıklarına ve sağlık eşitsizliklerine neden olarak ciddi sağlık sorunlarına etki etmektedir (Silva et al., 2023). Aktaş and Özdoğan (2016) stated that food-literate individuals should have a certain attitude towards food choices, including food safety, and that they should have gained the necessary knowledge and skills.

Importance and Purpose of the Study

Food literacy occupies a significant place in the literature. Some of these studies (Aktaş & Özdoğan, 2016; Block et al., 2011; Vidgen & Gallegos, 2014; Yıldırım et al., 2021), involve an effort to define food literacy, identify its components, and combine different definitions. The issue that is most prominent in many studies on food literacy is the necessity of training in food literacy. In recent years, studies (Ceyhun Sezgin et al., 2023; Mızık & Avdan, 2020; Yolcuoğlu & Kızıltan, 2021) have shown that sustainable food consumption will contribute to creating a lifestyle that can support sustainable development goals. The need for education about food literacy has attracted the attention of many researchers (Dülger & Ayaz-Alkaya, 2024; Meyn et al., 2022; Şanlıer & Güler, 2005; Scazzocchio et al., 2021; Ünver & Ünüsan, 2005) and it has been observed that food literacy training given for different age groups have yielded positive results in research on this subject.

The current research stands out from the previously mentioned studies in many aspects. *The Food Literacy Program (FLP), designed within the scope of the research, targets the primary school ages where food literacy will be most effective.* In addition, this program has been

designed to serve sustainable development goals, taking into account the principles of sustainable and ethical food consumption. It is seen that food literacy education to be given to primary school students with the FLP will be important in terms of raising individuals who prioritize the environment, community, and personal health and well-being recommended in previous research.

In this study, an instructional design process was carried out for the food literacy program. Instructional design is the use of instructional practices that take into account scientific data and processes (Küçükoğlu, 2022). Even though instructional design is expressed with various definitions, the common point is that the teaching path is determined based on the teaching paths appropriate to achieve the instructional objectives (Fer, 2015). The Morrison-Ross-Kemp Effective Instructional Design Model is student-centered and stands out with its flexible structure. Unlike linear design models, the model, which has a circular structure, consists of 9 independent steps (Morrison et al., 2012). This model was used as an instructional design model in the creation of the "Food Literacy Program" designed by the researchers with its flexible and learning features.

The aim of this study is to examine the effect of the "Food Literacy Program," which includes sustainable development goals prepared according to the Morrison-Ross-Kemp instructional design model, on the food literacy knowledge levels of primary school students. In this regard, the aim of the study is to evaluate the effect of FLP on the food literacy achievement levels of primary school students based on the achievement test scores obtained before and after the application.

Limitations

This study is limited to the achievement test scores of fourth-grade students attending a primary school in Kayseri Province during the 2024-2025 academic year, as assessed by the '*Food Literacy Program* (FLP)' developed according to the Morrison-Ross-Kemp instructional design model. The sample group for this study consists of 26 students. The data obtained from these students, selected using the typical case sampling method, limit the generalisability of the study but is considered sufficient to represent the population. No control group was used in this study. The main reason for this was to examine the effects of the FLP designed by the researchers on the target group and to minimise time and space constraints during implementation.

METHOD

Research Model

This research uses a single-group pre-test-post-test quasi-experimental design which is one of the quantitative research models. Quasi-experimental designs are generally used in the field of education, as they cannot be randomly assigned to control and experimental groups. This pattern, which is considered to be pre-experimental designs, is one in which the researcher observes the effectiveness of a new teaching method or an innovation in the

educational program (Cohen et al., 2021). In the single-group pre-test-post-test quasi-experimental design, the experimental procedure is performed. Before the intervention, a pre-test is applied to the group. After the independent variable (FLP) manipulated by the researcher is applied, the post-test is administered to the same group, and it is observed to what level the students achieve the food literacy knowledge determined as the dependent variable in the research (Büyüköztürk et al., 2021). A symbolic representation of the research design is given in Table 1.

Table 1

Single-Group Pre-Test-Post-Test Quasi-Experimental Pattern Modeling

Group	Pre-test	Intervention	Post-test
Experimental group	Achievement Test Score	FLP	Achievement Test Score

Independent Variable

In the research planned to be carried out, in the quasi-experimental design, FLP was accepted as an independent variable. It is a curriculum designed by the FLP researchers based on the Morrison-Ross-Kemp model. This model differs from other instructional design models in that it is cyclical, allows flexible transitions between program design stages, and prioritizes learner characteristics. The model consists of nine phases and eight processes that continue throughout the design process and cover the basic phases. At this stage of the research, the path followed by the researchers of the Morrison-Ross-Kemp model is described.

Identifying the need for teaching

In the Morrison-Ross-Kemp instructional design model, identifying instructional problems is the first stage of design. Correctly determining the teaching problem is a fundamental requirement for an effective training program. In this model, three different approaches are used to determine the training problem: needs assessment, goal analysis, and performance evaluation. In this study, needs assessment and target analysis approaches were used. The needs assessment consists of four stages: planning, data collection, data analysis and final report:

Planning: The Morrison-Ross-Kemp model identified six categories of needs. It is thought to fall into the categories of Felt Needs and Projected or Future Needs for the "Food Literacy Program". *Felt Needs:* It refers to the performance gap felt by the target audience or instructional designer in terms of improving the current performance. In this context, it suggests that primary school students do not have complete healthy eating habits and that education on this subject should be provided. *Projected or Future Needs:* It indicates the needs that are thought to arise in the future. This curriculum will be needed to minimise nutrition-related health problems of primary school students in later ages and to prevent the wrong

nutritional behaviours that may be imposed through both the environment and social media during adolescence.

It was decided to collect data for these two different types of needs (felt and projected needs). Primary school 4th grade students are the target audience for the needs analysis. The data were obtained with a questionnaire prepared by the designers. The questionnaire used in the needs analysis consists of 10 yes/no questions presented in Table 2, which aim to assess students' knowledge and behaviour regarding nutrition literacy. The questionnaire was administered to the students as a written document, and sufficient time was given after the necessary explanations were made for them to answer. The needs analysis was completed by calculating the frequency percentages of the survey items.

Data collection and data analysis: The participants of the needs analysis consisted of 28 students attending the 4th grade of primary school. The needs analysis form was developed by analyzing the Turkish Nutrition Guide (TÜBER) published by the Republic of Türkiye Ministry of Health Directorate General of Public Health (2022), the Turkish Food Literacy Strategy and Action Plan 2022-2028 published by FAO (2023), and various studies (Aktaş & Özdoğan, 2016; Bahar & Yılmaz, 2021; Öztürk, 2010) . Table 2 shows the needs, in line with these results, in the next Goal Analysis step:

Table 2

Needs Analysis Results Frequencies an Percentages Table

QUESTIONS	YES (f)	YES(%)	NO (f)	NO (%)
1. Is there a relationship between healthy eating and food literacy?	17	60,7	11	39,3
2. Should people with diseases such as diabetes and celiac disease change their diet?	19	67,9	9	32,1
3. Do you know what should be on a healthy dinner plate?	23	82,1	5	17,9
4. Should vegetables and fruits be on a healthy dinner plate?	23	82,1	5	17,9
5. Are meat and milk grain group foods?	13	46,4	15	53,6
6. Should your fluid consumption be higher when doing a physical activity?	3	10,7	25	89,3
7.Would you rather eat popcorn without oil and salt?	10	35,7	18	64,3

8. Have you ever read the portion information written on the nutrition label of a packaged food?	19	67,9	9	32,1
9. Do you have any information on what the ALO 174 line is about?	5	17,9	23	82,1
10. Do you prefer healthy snacks like vegetable chips for your birthday?	19	67,9	9	32,1

Final report: According to the information obtained from the questionnaire applied for the needs analysis, the students were found to have very little information about the safe food line ALO 174, the importance of fluid consumption in different conditions, and the special diets of genetic and non-communicable chronic diseases. In addition, they did not provide the expected level of responses in terms of food groups, nutrition label reading behavior and preference for healthy foods. In light of these results, it is thought that the target audience's needs can be met with the Food Literacy Program.

Goal analysis

Goal analysis is applied as a complement to a needs assessment or assuming a teaching need. The target analysis of this study was carried out through a literature review. Goal analysis is cascaded as Setting Goals, Reviewing Goals, Ranking Goals, Revisiting Goals and Final Order of Goals. From the goal analysis, the objectives are listed as having healthy nutrition knowledge, being able to list food groups, preparing healthy eating plates, defining food literacy, defining food safety, preferring sustainable and ethical food consumption, and recognizing healthy food preparation methods.

Learner characteristics and context analysis

One of the most important steps of the Morrison-Ross-Kemp instructional design approach is the correct analysis of the characteristics of the people who will participate in the training, as they significantly influence the general structure of the education program. In the model, various factors that may affect teaching positively or negatively are analyzed under the heading of context analysis.

In this study, the learners are primary school fourth-grade students. The target group of the training is 17 girls (60.7%) and 11 boys (39.3%) between the ages of 9–10. Students do not have a chronic illness that would prevent them from participating in food literacy education. Due to their age, students show behaviors such as preparing their own lunch boxes, shopping for food from the school canteen, and preparing foods that do not require long cooking, at home. Considering this training program and student characteristics, it is recommended that techniques such as group work, direct lecture, question-answer, demonstration and project-based activities can be used, and individual learning techniques should not be included because there are no students with learning difficulties. There are

two Syrian refugee students in the class, who are the target audience of the training. These two students speak and understand Turkish fluently because they have been living in Turkey for many years. In the activities to be held during the training program, examples of neighboring countries' or world cuisine dishes were given to appreciate the richness that arises from ethnic differences. There are no learners with disabilities in the classroom where the training program is implemented. These analyses of students were used during the design of the educational program. According to Morrison et al. (2012), cultural differences, in addition to personal and social characteristics, should be taken into account in the design phase of educational programs. The characteristics of learners are extremely important in selecting unbiased teaching materials and avoiding unequal learning situations (Pollock, 2001). This information shows that students participating in the training possess the manual and other motor skills required as prerequisites for the training, and that the cultural differences of refugee students who do not have language problems are taken into account in the program design phase.

64.3% of students stated that they did not have information about Food Literacy education, while 89.3% stated that Food Literacy education was necessary. In addition, 82.1% of students stated that they could participate in education even during extracurricular times. This also shows that students have the necessary motivation for this training program. Lighting, noise, temperature, seating arrangement, equipment, and transportation conditions of the classroom environment meet the requirements for the implementation of this program. Based on the applied research form, it was revealed that 75% of the students thought that the information they would acquire through Food Literacy training would affect their healthy eating behaviours.

Task analysis

In the Morrison-Ross-Kemp model, task analysis is performed with three techniques. These are topic analysis, which provides the identification of cognitive information, method analysis, which examines tasks that require psychomotor skills and the critical event method, which analyzes interpersonal skills and attitudes. The main purpose of the task analysis is to determine the knowledge and skills necessary to meet the identified teaching needs. In addition to facts and concepts such as "diabetes, obesity, sedentary behavior" to be conveyed to students in the eight main themes determined for the FLP, additional resources will be provided. Analyses of methods that require psychomotor skills, such as "preparing a healthy eating plate," were conducted using document reviews.

Instructional objectives

The goals set in the Goal Analysis phase for the FLP were followed by the process of writing behavioral objectives that align with the goals. Considering the Task Analysis phase, target behaviors for cognitive and affective areas were written, ensuring clarity in the learning objectives. Example behaviors are shown in Table 3.

Table 3

FLP Sample Goal-Behaviors

Theme 1. Healthy Eating
1. Tells the definitions of health, nutrition and healthy eating.
2. Lists common non-communicable chronic diseases in Turkey and in the world.
3. Establishes the relationship between healthy nutrition and non-communicable chronic diseases.
Theme 7. Sustainable and Ethical Food Consumption
2. Selects local and seasonal foods.
3. Regulates food consumption in a way that reduces waste.
4. Prefers to use environmentally friendly and recyclable food packages.

Content sorting

In this section, the objectives identified in the previous section are ranked according to the ranking schemes of Posner and Strike (1976). Three types of sort schemes are proposed by Posner and Strike (1976). In the first scheme related to learning, the characteristics, interests, prerequisite knowledge and mental development of learners are taken into account (Posner and Strike, 1976, as cited in Morrison et al., 2012). Another scheme is the ordering of concepts. In this scheme, it is proposed to teach concepts gradually, follow a path from the concrete to the abstract, and provide logical prerequisites. Considering the needs analysis and the goals set, the ranking charts determined by Posner and Strike (1976) were applied to the FLP. The objectives of the program were revised -as shown in Figure 1- according to the logical order of student characteristics and concepts, as well as the order in which the program will keep student motivation at a high level.

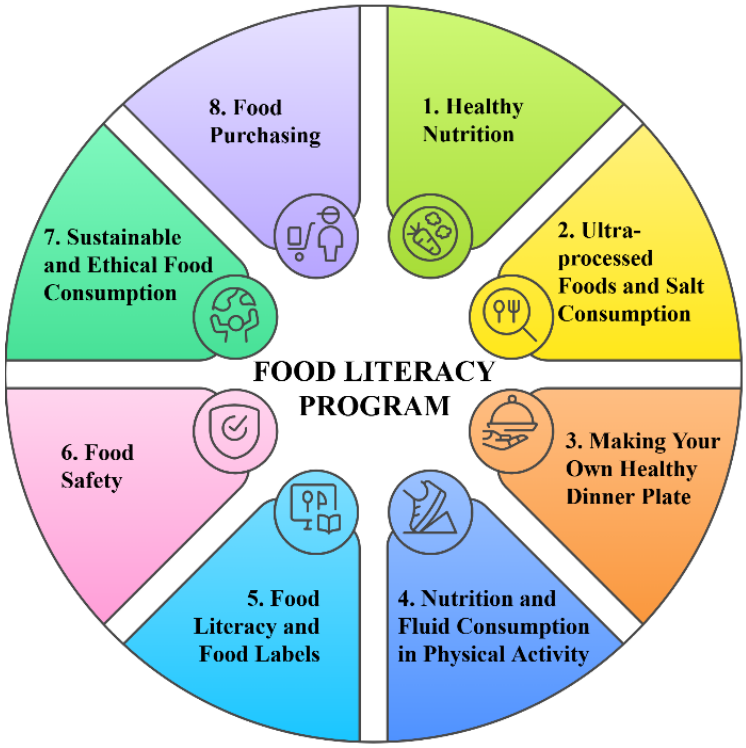

Figure 1. Sorted food literacy program themes

Instructional strategies

The classification of the goals, the characteristics of the learners, and their active participation in the course were considered while determining the teaching strategy to realize permanent learning. As suggested by the model, "Initial Presentation, Productive Strategy and Motivation Strategies" were determined for each goal. Some example strategies are presented in Table 4.

Table 4

Exemplary Teaching Strategies for the FLP

Goal 1. 2. It lists the common non-communicable chronic diseases in Turkey and in the world. *Motivation Strategy: A* video showing the difficulties experienced by an obese person while doing daily tasks such as climbing stairs and wearing clothes and shoes is watched. *First Presentation: Definitions of obesity, diabetes, cancer, and cardiovascular diseases are accompanied by visuals that will illustrate these diseases.* *Generative Strategy: Explains* their own ideas by thinking about the difficulties experienced by people with these diseases in their immediate environment.
Goal 5. 2. Using model foods, it selects the diet and the amount of fluid for different activity states.

First Presentation: The pyramid of healthy eating and physical activity is explained through projecting it on the screen. Then, a healthy dinner plate is prepared by the teacher according to the students' physical activity status.
Generative Strategies: Students in the classroom are asked to prepare new healthy eating plates according to the physical activity status expressed by the teacher.

Instructional message design and developing ınstructional material

At this stage of the design, the teacher's guidebook and the student's book were designed. To make the teaching rich and remarkable, the pre-regulators recommended by the Morrison-Ross-Kemp model were used at the beginning of the chapter. At the beginning of each theme, a short story is presented to draw attention to the theme objectives. The student who will read this story will have preliminary knowledge about the subject and will be curious to learn more about it.

Universe and Sample of the Research

The population of the study comprises primary school students studying in the 4th grade in the 2024-2025 academic year. The sample group consisted of 26 students studying in the fourth-grade in a primary school in Kayseri, 14 girls (54%) and 12 boys (46%), who were selected by typical case sampling technique, which is one of the purposive sampling methods. The typical case sampling method is a non-probability method. The sample selected by this method is expected to represent the universe in the most typical way (Büyüköztürk et al., 2021; Cohen et al., 2021; Gürbüz & Şahin, 2018). Since the curriculum designed for the research is aimed at being applied to students in the 10-12 age group, it was found appropriate to sample the students studying in the 4th grade.

Data Collection Tools and Implementation

An achievement test was prepared for data collection in the study. The achievement test, used as a pre-test and post-test in accordance with the experimental design, is a multiple-choice test prepared by researchers with FLP targets in mind. The test questions cover topics such as food groups, healthy eating habits, food label reading behaviours, and sustainable and ethical food consumption. The test aims to measure not only the knowledge level of food literacy but also comprehension and application skills, as well as objectives related to the affective domain. Here are a few example questions from the achievement test: 'Why is it important to limit the consumption of ultra-processed foods?' 'Which of the following statements is a result of exceeding daily salt intake?' 'What is the fundamental principle underlying sustainable food consumption?'

A pool of 40 questions was created for the achievement test; expert opinions were obtained as part of validity studies; and the test was piloted in a different fourth-grade class at the same school. The questions were revised based on the item difficulty and

discrimination coefficients obtained at the end of the pilot application, and the test was finalized with 31 questions. The Kuder Richardson, (KR-20) reliability coefficient should be preferred because the answers given to a success test are evaluated as correct or incorrect with two options. A KR-20 coefficient above 0.70 is an appropriate value for the reliability of the test (Büyüköztürk et al., 2021). The KR-20 coefficient for the prepared achievement test was calculated as 0.79 for the pre-test and 0.84 for the post-test. Before the application started, the necessary information was given to the students, and a pre-test was conducted. After the pre-test, the FLP, which was designed for 12 hours, was carried out with 26 students, and the post-test took place at the end of the application.

Data Analysis

In the research conducted using a single-group pre-test-post-test design, the pre-test and post-test were applied to the sample group. The success scores obtained from the pre-test and post-test were subjected to normality tests separately. In addition to the skewness and kurtosis coefficients, the Shapiro-Wilk normality test was taken into account because the sample was less than 30 people (Uysal & Kılıç, 2022). As can be seen in Table 5, a paired samples t-test was applied to understand the difference between the pre-test and post-test success scores due to the normal distribution of the data.

Table 5

Pre-Test and Post-Test Normality Test Results

			Shapiro-Wilk		
	Skewness	**Kurtosis**	**Statistics**	**Sd**	**p**
Pre-Test	-,147	-,448	,983	26	,923
Post-Test	-,255	-,448	,940	26	,137

Ethical Considerations

In the course of this research, we paid scrupulous attention to ethical guidelines, ensuring that the integrity and reliability of the study were never compromised. In alignment with the overarching commitment to ethics, this study stringently adhered to all provisions delineated in the "Higher Education Institutions Scientific Research and Publication Ethics Directive." It is imperative to note that there were no activities, which might infringe upon the clauses stated under the "Actions Against Scientific Research and Publication Ethics.

Ethical Review Board: Erciyes University Social Sciences Ethics Committee

Date of Ethics Review Decision: 30/01/2025

Ethics Assessment Document Issue Number: 019

In addition, permission to conduct research at the school was obtained in accordance with the provisions of the "Research Implementation Permits regulation of the Ministry of National Education".

Application Board: Research Application Permits Application and Evaluation System

Date of Application Decision: 18/02/2025

Application Document Number: MEB.TT.2025.019251

FINDINGS

Within the scope of this study, a quantitative, quasi-experimental research model using a single-group pre-test and post-test was designed to examine the effect of a Food Literacy Program developed using the Morrison-Ross-Kemp instructional design model on the food literacy behaviours of primary school students. The study was conducted with 26 fourth-grade students (14 girls and 12 boys) attending an elementary school in Kayseri during the 2024-2025 academic year. Although the gender distribution was reported for descriptive purposes, gender-based analyses were not performed, as this was not the focus of the study. The intervention process lasted 12 class hours over 3 weeks. In the first class hour, the students completed the pre-test; the FLP was applied for 10 class hours, and the post-test was administered in the last class hour. A 31-item achievement test consisting of multiple-choice questions was used as the pre-test and post-test. The data were analysed using the IBM SPSS 25.0 software package. The normality of the data was verified using skewness-kurtosis coefficients and the Shapiro-Wilk normality test. The Levene test was performed to determine whether the pre-test and post-test scores showed homogeneous variance. The results of the Levene test indicated that the pre-test ($F=1.321$; $p>0.05$) and post-test ($F=1.137$; $p>0.05$) scores had homogeneous variance. The results of the analysis of the paired samples t-test are shown in Table 6. The significance level of the test was determined as $p < 0.05$.

Table 6

Pre-Test and Post-Test Scores Paired Samples t-test

	n	$\bar{x}$	ss	t-test		
				t	sd	p
Pre-Test	26	17,31	6,032	-4,866	2,338	,00*
Post-Test	26	19,54	5,602			

*p<0.05

As seen in Table 6, the post-test mean of the students ($\bar{x}=19.54$; $ss=5.602$) is higher than the pre-test mean ($\bar{x}=17.31$; $ss=6.32$). The score obtained for the difference between the two test scores [$t(2.338)=-4.866$; $p<0.05$] shows that this difference is statistically significant. The

effect size calculated using Cohen's d coefficient is 0.38. This indicates that the intervention had a small practical effect on students' food literacy. These findings indicate that the FLP provided a significant increase in student achievement levels, and therefore the programme was effective.

CONCLUSION, DISCUSSION AND RECOMMENDATIONS

In this study, the FLP designed by the researchers based on the Morrison-Ross-Kemp instructional design model was applied, and as a result, it was determined that the FLP was effective in instilling food literacy behaviors in primary school students, including sustainable development goals. In parallel with these results, Ünver and Ünüsan (2005) reported that the nutrition education program applied to preschool students had positive effects on the students. On the other hand, Gümüş Şekerci (2019) observed a significant increase in the nutritional self-efficacy, attitude, and behavior scores of primary school students classified as having low body mass index following nutrition education for the experimental group. In Italy, Scazzocchio et al. (2021) stated that the nutrition program called 'MaestraNatura', which was implemented in schools with 1390 students between the ages of 6-13, received the approval of 94% of the teachers, and that this program provided a n improvement in the students' nutritional habits. In their research on the nutritional habits of adolescents, Ghadirian et al. (2022) stated that supporting adolescents with low literacy levels in critical nutritional literacy with participatory video programs improved food knowledge and food choices. Studies conducted by Begley et al., (2019, 2020) and Meyn et al. (2022) on adults state that well-designed food literacy programs improve adults' long-term food literacy and dietary intake, and that these programs are also effective in areas such as food management, selection, and preparation. In light of all these studies, it can be stated that well-prepared food literacy programs are effective in individuals' healthy interaction with food. Demirci and Çelik (2022), Bahar and Yılmaz (2021) and Arslan et al. (2024) stated that individuals should be given food literacy through educational programs. Kempler et al. (2024) pointed out that individuals should be introduced to food literacy programs at an early age. Ertaş Öztürk et al. (2024) stated that sustainable development awareness gained at an early age will increase sustainable agricultural activities and develop ethical food consumption behaviors, thereby creating a supply-demand balance.

In light of all these studies, it can be said that the Morrison-Ross-Kemp instructional design model provides an appropriate framework for teaching content that includes cognitive and affective goals such as food literacy. The findings reveal that the model supports the achievement of behavioral goals such as sustainable nutrition, reading food labels, and conscious food consumption, thanks to its structured and student-centered approach. It has been demonstrated that this model can provide an appropriate instructional structure for the implementation of food literacy programs. This forms the basis for the following recommendations.

The findings are valid for a small sample group receiving fourth-grade education, and should be carefully evaluated before being generalized to larger sample groups. Similar programs may be beneficial when applied to students in other regions, taking into account local needs and the needs of different socioeconomic levels. Following these applications, the effectiveness of food literacy programs mentioned in the literature when incorporated into the education system as elective courses, may contribute to students making healthy and sustainable food choices.

The effect size of the study is between small and medium according to Cohen's classification. This indicates that the intervention has a positive effect, but its practical power remains limited. Therefore, it is recommended that future interventions be planned for longer periods, the content be intensified, and different measurement tools be used. Additionally, it is believed that the program's impact can be more accurately assessed with larger samples and controlled research designs.

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Data Availability Declaration

Data Availability Upon Formal Request:

While the primary datasets utilized in this study are not publicly accessible due to certain constraints, they are available to researchers upon a formal request. The authors have emphasized maintaining the integrity of the data and its analytical rigor. To access the datasets or seek further clarifications, kindly reach out to the corresponding author. Our aim is to foster collaborative academic efforts while upholding the highest standards of research integrity.

Author Contributions

All authors, Mehmet YILDIRIM and Semra DEMİR-BAŞARAN contributed equally to this work. They collaboratively handled the conceptualization, methodology design, data acquisition, and analysis. Each author played a significant role in drafting and revising the manuscript, ensuring its intellectual depth and coherence. All authors have thoroughly reviewed, provided critical feedback, and approved the final version of the manuscript. They jointly take responsibility for the accuracy and integrity of the research.

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