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A Research on the Awareness Levels of Secondary School Students about Some Concepts Related to Agriculture: An Example of Kars

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Abstract

This study aims to determine the awareness levels of our students residing in urban and rural areas regarding their perceptions of selected current fundamental concepts which are related to interdisciplinary learning-based agriculture. The data are collected with a questionnaire containing 16 current agricultural concepts developed by the researcher. Survey research, which is one of the quantitative research methods, is used as the research method. The study is conducted with 1209 secondary school students (5-8th grades) using a layered purposive sampling method. The results show that the awareness levels of the students participating in this study regarding current concepts in agriculture differ in gender, class level, father's profession, and the characteristics of the place of residence. Despite variations in some concepts, in general, it is observed that male students in 7th and 8th grades, the students whose fathers are farmers, and those residing in villages and county towns have an advantage in terms of the gender variable. It is observed that our students have lower knowledge levels in terms of heirloom, genetically modified seeds, medicinal and aromatic plants, and agricultural ecology among the 16 current concepts and they seem to be more knowledgeable about concepts such as good farming practices, desertification, water management, drought, human-induced soil degradation, food safety, and conservation of plant. Especially our students, who are the future of our society, need to have basic knowledge about agriculture in order to make decisions about agriculture. In the light of the results obtained from our study, it can be said that teaching agriculture as a course in secondary schools or including these subjects in the content of science courses will contribute to our country and our world.

Keywords: Agriculture, agriculture literacy, some concepts related to agriculture

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Introduction

People rely on agriculture to meet most of their basic needs. In the 21st century, there is no more important societal problem than the growing imbalance between the human population and the resources that sustain it (Douglass, 1985). Agriculture includes all agricultural products, including food, clothing, wood products, horticulture, and other plant and animal products. Agriculture also encompasses the economic, sociological, political, environmental, and cultural aspects related to the financing, processing, marketing, and distribution of agricultural products, farm production, supply and service industries, healthy nutrition and food consumption, as well as the use and conservation of land and water resources, and food and clothing systems (Wallace, 1995).

The fact that agriculture is the first field of science dating back to the Neolithic age and has gained vital importance, especially in the last century, draws the attention of the fields of economy, health, security, and education. According to Martin J. Frick, Kahler, and Miller (1991), agriculture has the power to influence a nation's and individuals' food, health, stability, and economic well-being. The Great Economic Depression, which started in the United States in 1873 and spread to Europe, caused a large part of the population to move away from agriculture, together with the first global depression brought about by industrialization and the uncontrolled migration from rural communities to urban areas. As a result, the transition from rural areas to urban life has caused a decline in agricultural societies (Blanke, 2016).

People depend on agriculture to meet a significant part of their basic needs, so it is imperative that countries understand the vital importance of agriculture for future generations. According to the data shared by the United Nations, the global population is estimated to reach 9.75 billion people by 2050 and 11.2 billion people by 2100 (Martin Joseph Frick, 1990; United Nations, 2015). This increase in population, the gradual decrease in the food that provide us with a healthy diet, the negative factors that occur in our environment and the change in the seasons increase the importance of agriculture in our lives (Akgül &Akgül,2011). In addition, the encroachment of housing areas on quality agricultural lands, the threat to water resources, and the challenges that will arise against ecological imbalances make interdisciplinary studies necessary for planning. Throughout this entire process, educating conscious citizens and literate individuals is an important responsibility for educators (D. E. Wright, 1992).

Hurd (1958), when the concept of "literacy" was introduced to the scientific field, expresses the idea that one of the objectives of agricultural education, like many other fields, should be to cultivate agriculturally literate individuals. Lightcap (2008) argues that the concept of agricultural literacy was first introduced in the world as a result of institutional efforts in private and public schools in 1862. The Morrill Act (Land-Grant College Act), signed by U.S. President Lincoln on July 2, 1862, is cited as the first official study on this subject. According to this law, public land has been provided to every senator and representative for them to generate income, and the income obtained from public lands has been allocated for the opening of at least one college in each state that could provide education on agriculture and mechanization. (Lightcap, 2008). With the implementation of the Morrill Acts of 1862 and 1890, the purpose of education was redefined from its classical meaning, preparing students for learning situations they would encounter outside the classroom and opening the way for extracurricular learning activities (Lightcap, 2008).

In the early 1980s, the idea of using agriculture as a teaching tool in primary schools was put forward for a program called "In-Class Agricultural Education" in the United States. The idea has been put into practice and used in many schools by associating agricultural concepts with the academic fields of mathematics, art and science, and learning environments have been created for students in areas such as nature study and practice garden (Hillison, 1998). We infer that these studies, which started in the 19th century, have been developing until today.

In 2013, researchers, practitioners, and government officials in the United States came together to develop a national agricultural literacy model. As a result of this collaboration, an agriculturally literate individual is defined as "someone who understands and can communicate the components and importance of agriculture because it has a function above the subsistence level" (Spielmaker, Pastor, & Stewardson, 2013). Since its inception, the concept of agriculture literacy has been based on the idea

that every person should have a minimum level of knowledge about the industry that produces and markets the food they need to survive (Martin J. Frick, Birkenholz, & Machtmes, 1995).

Wright et al. (1994) defines agriculture literacy as attitude, while Frick et al. (1995) define agriculture literacy as knowledge and perception of agriculture, food and natural resources instead of attitude. In the following process, we see that researchers have moved away from a knowledge-based understanding of agriculture and moved to define agricultural literacy in terms of conversational knowledge, critical analysis and value-based judgment (Powell, Agnew, & Trexler, 2008). Furthermore, Meischen and Trexler (2003) argue that the literacy development reflected in today's society's interaction with agriculture is built around culturally based beliefs, values and attitudes, leading to the ability to make judgments depend on culturally based norms and that agriculture is a culture in itself. As a result of the literature review on the definition of the concept of agriculture literacy, it is seen that there is no consensus on the definition. The reason for the disagreement may have been due to philosophical, political, and epistemological differences among researchers (Powell et al., 2008).

While the idea of opening village institutes in order to train individuals who are competent in the professional field and learning by experience environments, which was started in our country in the 1940s, was brought to the agenda by the National Research Council in the USA in 1988, it came to the agenda after the 1990s in other developed countries such as England, Australia, Poland, France, Spain and the Netherlands. This approach shows how correct our initial education system was. Today, we should include agriculture in our education system in order to raise agriculture-literate individuals.

The philosophical foundation that supports the need for agricultural awareness in elementary classrooms is based on Dewey's (1938) philosophy of experiential education. Dewey states that anything that can be called research, whether it is arithmetic, history, geography, or any of the natural sciences, must be derived from material that initially falls within the scope of ordinary life experience (Dewey, 1938). Dewey emphasizes the principle of providing students with an education that familiarizes them with scientific subjects and enables them to reduce the facts and laws of science to their daily social practices. Dewey believes that applying this method is the most accurate way to understand the current scientific, economic, and industrial problems in society. In addition, Dewey also suggests that the process of vocational education improves relationships between people and social groups.

Fasheh (1990) expands the definition of community-based education advocated by Dewey. Fasheh argues that a curriculum should be flexible and dynamic enough to provide a supportive environment for students to develop their own values and respond to their diverse needs in an ever-changing environment. The sense of self-esteem must be linked to concrete situations and life-enriching production.

Knobloch and Martin (2002) emphasize in a study that many researchers recommend teaching agriculture in primary education. According to Desmond, Leising, King, Rilla and Coppock (1990) and NRC (1988), all students from kindergarten to twelfth grade need education in agriculture. Elementary school students need authentic learning experiences in community-based subjects to motivate them, develop questioning skills, apply academic content, and relate their learning beyond the classroom context.

It is necessary to provide the right agricultural information in a clear, concise and complete manner in order for our generations to make informed personal and public decisions about their lives. Therefore, it is important to understand our students' knowledge and views on agriculture (Jack Elliot, 1999). Based on the opinions and studies of many agricultural experts, as well as the results from recent research, there is a consensus that a significant majority of the population cannot answer questions about basic agricultural concepts and is not agriculturally literate (J. Elliot & Frick, 1995; J. F. Elliot & Dado, 1992; Geasler et al., 1987; Russell, 1990; Vining-Koch, 1986). The agricultural knowledge and perception held by students and adults, often referred to as agriculture literacy, has gained increasing importance in the literature (R. J. Birkenholz & Stewart, 1991). In line with the developing technology and the expectations of the society, interest in conventional agriculture is gradually decreasing. In order to overcome this situation, they stated that up-to-date comprehensive agricultural

programs should be developed and implemented starting from primary education (Haşıloğlu et al., 2011).

Considering the changes made in education programs in recent years, it has been seen that educational activities now require application-based classroom and out-of-school zoos, botanical gardens and garden-based learning environments rather than only in-class environments (Aydın, Bakırcı, & Ürey, 2012). It has been observed that studies in which activity evaluation studies for school garden practices intended for teachers have been conducted come to the forefront (Ürey et al., 2020).

As stated in the field surveys above, teaching the subject of agriculture in primary education by associating it with daily life and integrating it with other fields will be effective first-hand in better understanding today's scientific, economic and social problems. It has become mandatory for the global warming problem, which is at the forefront as a major threat to our world today, to be included more comprehensively in school science programs. Therefore, it can be said that the study, based on interdisciplinary learning, is relevant to agriculture, and it seeks to determine our students' awareness levels regarding selected fundamental concepts. In light of the data obtained, it offers a perspective for future research in this field and contributes to the improvement of science content in the curriculum. Educational researchers have an important responsibility in raising agriculturally literate individuals, which is summarized in the historical process. In this direction the aim of the study is to determine the awareness levels of middle school students about agricultural concepts in terms of different variables (gender, grade level and father's occupation, living area). The following questions have been addressed in the research:
The awareness levels of students regarding the selected concepts;

How does the distribution of awareness levels of students regarding the selected concepts differ in:

1. Gender
2. Class level
3. The characteristic of the place of residence
4. Parental occupations

Method

Research Model

In this study, it is carried out using the survey research method, which is a quantitative research method. Survey researches are studies in which the opinions, views or characteristics such as interests, skills, abilities, attitudes, etc. of large groups are determined. Survey research primarily enables finding answers to questions like "what, where, when, how often, to what extent, how." The focus of the researcher is not so much on where ideas and significant details come from or what influences them but rather on how they are distributed among the individuals in the sample in such research. (Fraenkel & Wallen, 2006).

Population-sample/research group

It consists of 1209 secondary school students selected by layered purposive sampling method from 20,426 students in total residing in the central and central districts and villages of Kars province, 52.7% of whose population is engaged in agriculture and animal husbandry in the Eastern Anatolia Region. The participants consist of 595 female and 614 male students. "250 of the participants are 5^{th} graders (21%), 327 are 6^{th} graders (27%), 302 are 7^{th} graders (25%), and 330 are 8^{th} graders (27%)."

Data Collection Tools

The questionnaire prepared by the researchers consists of sixteen selected concepts related to current agriculture, including sustainable agriculture, agriculture security, good farming practices, heirloom, agricultural development, fighting drought, desertification, conservation of plant, genetically modified seeds, water management, food safety, biodiversity, medicinal and aromatic plants, habitat, human-induced soil degradation, and agricultural ecology. The students are asked to indicate their awareness of these concepts by choosing one of the statements that best describes their familiarity: “I have heard and I know,” “I have heard, but I have no knowledge,” or “I have never heard.” Before starting the study, the permission of the Ethics Commission of Hacettepe University is obtained. Subsequently,

data collection is carried out by obtaining the consent of the Provincial Directorate of National Education of the Governorship of Kars dated 11.11.2022 and numbered 605.01-63413569. During the process of creating the questionnaire items, the questionnaire items were finalized by receiving positive (90%) and negative (10%) feedback from 7 academicians and 5 science teachers who are experts in the field.

Data Analysis

The variable for the mother's occupation is not considered when 83.5% of them are housewives. According to the three options defined above, the percentages of the answers given by the participants are calculated and the significance of the difference between the percentages is examined. The study is analyzed with frequency, percentage, simple descriptive and comparative statistical procedures using SPSS Windows 21.0 version program.

Fındings

This section includes the findings and comments obtained as a result of the analysis of the data from the agricultural awareness questionnaire.

Table 1.
Agricultural concepts (Sustainable agriculture, heirloom, good agriculture, Agriculture security)

Concepts	Variables		I Know %	I have heard but I have no knowledge %	I have never heard %	Concepts	Variables		I Know %	I have heard but I have no knowledge %	I have never heard %
Sustainable Agriculture	Gender	Female	14	19	16	Heirloom	Gender	Female	13	10	26
		Male	22	17	12			Male	15	13	23
	Class Level	5th grade	7	7	7		Class Level	5th grade	7	4	10
		6th grade	10	7	10			6th grade	8	5	14
		7th grade	8	10	7			7th grade	5	6	14
		8th grade	11	12	5			8th grade	8	8	11
	Father's Profession	Unemployed	6	6	4		Father's Profession	Unemployed	5	4	6
		Officer	6	9	6			Officer	5	6	10
		Farmer	11	10	6			Farmer	9	6	14
		Laborer	10	8	8			Laborer	7	5	14
		Craft	3	4	3			Craft	2	2	5
	Characteristic of the place of residence	City	10	11	8		Characteristic of the place of residence	City	9	7	13
		County Town	10	12	11			County Town	7	8	18
		Village	16	13	9			Village	13	7	18
Good Agriculture	Gender	Female	28	12	10	Agriculture Security	Gender	Female	22	18	9
		Male	31	11	9			Male	23	16	11
	Class Level	5th grade	11	5	5		Class Level	5th grade	9	8	4
		6th grade	14	6	7			6th grade	12	7	7
		7th grade	14	6	4			7th grade	11	10	4
		8th grade	19	6	2			8th grade	13	10	5
	Father's Profession	Unemployed	9	4	3		Father's Profession	Unemployed	7	5	3
		Officer	10	6	5			Officer	8	8	5
		Farmer	18	7	3			Farmer	14	9	5
		Laborer	16	6	4			Laborer	13	9	5
		Craft	5	1	3			Craft	4	3	2
	Characteristic of the place of residence	City	15	7	7		Characteristic of the place of residence	City	12	11	6
		County Town	17	9	7			County Town	14	11	8
		Village	26	8	5			Village	19	13	6

When Table 1 is evaluated, the knowledge about the concept of sustainable agriculture is examined in terms of various variables. Accordingly, it is observed that male students in terms of gender variable, 6t^{h} and 8th graders in terms of class level, those whose fathers are farmers and laborers, and those residing in the village have higher knowledge about the concept. On the other hand, it is observed that the children of craft have a low level of knowledge about the concept of sustainable agriculture.

When Table 1 is examined, it can be observed that the level of knowledge about the concept of heirloom differs in gender, class level, father's profession, and the characteristics of the place of residence. This difference is seen in favor of male students (15%) in terms of gender variable, 8th graders (8%) in terms of class level, those who are farmers (9%) in terms of profession, and those residing in the village (13%) in the characteristics of the place of residence.

When Table 1 is evaluated, the knowledge about the concept of good agriculture is examined in terms of various variables. According to this, it is observed that male students in terms of gender variable, the 6th, 7th and 8th graders in terms of class level, those whose fathers are farmers and laborers, and those residing in the village have higher knowledge about the concept.
When Table 1 is examined, it can be observed that the level of knowledge about the concept of agriculture security differs in gender, class level, father's profession, and the characteristics of the place of residence. This difference is in favor of male students (23%) in the gender variable, 8th grade students (13%) in terms of class level, those whose fathers are farmers (14%) in terms of father's profession, and those who reside in the village (19%) in the characteristics of the place of residence, which means that they have more knowledge about the concept in question.

Table 2.
Agricultural concepts (Desertification, water management, fighting drought, human-ınduced soil degradation)

Concepts	Variables		I Know %	I have heard but I have no knowledge %	I have never heard %	Concepts	Variables		I Know %	I have heard but I have no knowledge %	I have never heard %
Desertification	Gender	Female	30	11	8	Fighting Drought	Gender	Female	30	11	9
		Male	31	10	9			Male	34	11	6
	Class Level	5th grade	12	5	4		Class Level	5th grade	13	5	3
		6th grade	15	6	6			6th grade	15	6	6
		7th grade	16	5	3			7th grade	16	6	3
		8th grade	18	6	4			8th grade	19	5	3
	Father's Profession	Unemployed	10	3	2		Father's Profession	Unemployed	10	3	2
		Officer	12	5	4			Officer	12	6	4
		Farmer	16	8	4			Farmer	19	5	4
		Laborer	16	4	6			Laborer	17	5	4
		Craft	7	1	1			Craft	7	1	1
	Characteristic of the place of residence	City	19	6	4		Characteristic of the place of residence	City	19	7	4
		County Town	20	6	6			County Town	20	7	5
		Village	22	10	7			Village	25	7	6
Water Management	Gender	Female	23	15	12	Human-Induced Soil Degradation	Gender	Female	19	16	14
		Male	26	15	10			Male	25	13	13
	Class Level	5th grade	10	5	5		Class Level	5th grade	9	5	7
		6th grade	13	8	6			6th grade	11	8	9
		7th grade	12	7	5			7th grade	11	8	7
		8th grade	14	9	4			8th grade	13	9	5
	Father's	Unemployed	7	5	4		Father's	Unemployed	6	6	3

	Profession	Officer	9	7	5		Profession	Officer	9	7	5
		Farmer	15	8	5			Farmer	13	8	7
		Laborer	14	7	6			Laborer	11	7	9
		Craft	5	3	2			Craft	4	2	3
	Characteristic of the place of residence	City	14	9	7		Characteristic of the place of residence	City	13	9	7
		County Town	15	10	8			County Town	13	9	10
		Village	20	11	7			Village	17	11	9

When Table 2 is examined, the relationship between the knowledge of desertification and various variables is investigated. According to these data, it is observed that the knowledge of male and female students about the concept is close to each other, and the knowledge levels of the children of laborers and farmers and children residing in the village and county town are higher in the 6th and 8th grades.

When Table 2 is examined, the relationship between the knowledge about the concept of fighting drought and various variables is seen. According to this data, it can be observed that male students have a higher level of knowledge about fighting drought than female students, 8th grade students have a higher level of knowledge than the students in other grades, the children of farmers have a higher level of knowledge than the children from other occupational groups, and those residing in villages have a higher level of knowledge than others.

Table 2 shows the distribution of knowledge about the concept of water management based on the responses provided. Accordingly, it is seen that male students have higher knowledge than female students, 6th and 8th grades have higher knowledge than other classes, the children of farmers and laborers have higher knowledge than the children of other occupational groups, and those residing in the village where they live have higher knowledge than the others.

When Table 2 is examined, it can be seen that the level of knowledge about human induced soil degradation differs in gender, class level, father's profession, and the characteristics of the place of residence. This difference is observed in favor of male students (25%), 8th grade students (13%), those whose fathers are farmers (13%), and those residing in villages (17%) in terms of gender, class level, father's profession, and place of residence variables. In addition, it is seen that the level of knowledge also increases as the class level increases.

Table 3.
Agricultural concepts (genetically modified seed, food safety, medicinal and aromatic plants, agricultural development)

Concepts	Variables		I Know %	I have heard but I have no knowledge %	I have never heard %	Concepts	Variables		I Know %	I have heard but I have no knowledge %	I have never heard %
Genetically Modified Seed	Gender	Female	15	13	21	Food Safety	Gender	Female	28	12	9
		Male	21	12	17			Male	28	13	10
	Class Level	5th grade	5	5	10		Class Level	5th grade	12	4	4
		6th grade	8	7	12			6th grade	15	6	6
		7th grade	8	7	11			7th grade	14	7	4
		8th grade	14	7	6			8th grade	15	7	5
		Unemployed	5	4	6			Unemployed	8	4	3
	Father's Profession	Officer	9	5	7		Father's Profession	Officer	11	7	4
		Farmer	10	7	11			Farmer	17	6	5
		Laborer	8	7	11			Laborer	16	6	5
		Craft	3	2	4			Craft	5	2	2
	Characteristic of the place	City	12	6	11		Characteristic of the place	City	17	7	6
		County Town	10	9	13			County Town	17	9	7

	of residence	Village	14	10	14		of residence	Village	23	8	7
Medicinal and Aromatic Plants	Gender	Female	14	13	22	Agricultural Development	Gender	Female	13	18	18
		Male	18	13	20			Male	19	15	16
	Class Level	5th grade	6	5	10		Class Level	5th grade	6	6	9
		6th grade	10	6	11			6th grade	9	7	11
		7th grade	7	7	10			7th grade	7	10	7
		8th grade	9	8	10			8th grade	11	10	7
	Father's Profession	Unemployed	6	3	6		Father's Profession	Unemployed	6	5	5
		Officer	7	6	8			Officer	7	7	7
		Farmer	9	8	11			Farmer	9	10	9
		Laborer	7	7	12			Laborer	8	8	10
		Craft	3	2	4			Craft	3	3	4
	Characteristic of the place of residence	City	11	9	10		Characteristic of the place of residence	City	12	9	8
		County Town	10	8	15			County Town	8	11	14
		Village	12	10	17			Village	12	13	12

Table 3 is examined to investigate the relationship between knowledge about genetically modified seeds and various variables. According to this data, it can be observed that male students have a higher level of knowledge about the concept of genetically modified seeds than female students, 8th grade students have a higher level of knowledge than students in other grades, the children of farmers have a higher level of knowledge than children from other occupational groups, and those residing in villages have a higher level of knowledge than others regarding genetically modified seeds.

Table 3 shows the distribution of the responses to the concept of food safety. According to this data, it can be observed that male students have a higher level of knowledge than female students, 6th, 7th, and 8th grade students have a higher level of knowledge than the students in other grades, the children of farmers and laborers have a higher level of knowledge than the children from other occupational groups, and those residing in villages have a higher level of knowledge than the others.

When Table 3 is examined, the distribution of the answers given to the concept of medicinal and aromatic plants is given. According to this data, it can be observed that male students have a higher level of knowledge than female students, 6th and 8th graders, the children of farmers and those residing in villages have a higher level of knowledge than others.

When Table 3 is examined, it can be seen that the level of knowledge about the concept of agricultural development differs in gender, class level, father's profession, and the characteristics of the place of residence. This difference is observed in favor of male students (19%), 8th grade students (11%), the children of farmers (9%), and those residing in villages (12%) in terms of gender, class level, father's profession, and place of residence variables.

Table 4.
Agricultural concepts (Biodiversity, habitat, agricultural ecology, conservation of plants)

Concepts	Variables		I Know	I have heard but I have no knowledge	I have never heard	Concepts	Variables		I Know	I have heard but I have no knowledge	I have never heard
			%	%	%				%	%	%
Biodiversity	Gender	Female	18	14	17	Habitat	Gender	Female	18	13	18
		Male	18	17	16			Male	21	12	17
	Class Level	5th grade	5	6	9		Class Level	5th grade	6	5	10
		6th grade	9	8	10			6th grade	10	6	11
		7th grade	9	9	7			7th grade	13	6	6
		8th grade	13	8	7			8th grade	11	9	8
	Father's Profession	Unemployed	6	6	4		Father's Profession	Unemployed	7	5	3
		Officer	8	6	7			Officer	10	5	6

		Farmer	9	9	10			Farmer	10	7	11
		Laborer	10	7	9			Laborer	10	5	11
		Craft	3	4	3			Craft	4	2	3
	Characteristic of the place of residence	City	12	8	10		Characteristic of the place of residence	City	14	8	8
		County Town	12	11	10			County Town	13	7	13
		Village	13	12	13			Village	13	10	15
Agricultural Ecology	Gender	Female	14	14	21	Conservation of Plants	Gender	Female	32	11	6
		Male	20	14	17			Male	32	11	7
	Class Level	5th grade	7	4	9		Class Level	5th grade	13	5	3
		6th grade	9	7	11			6th grade	15	7	6
		7th grade	8	8	9			7th grade	16	6	3
		8th grade	10	8	9			8th grade	20	5	2
	Father's Profession	Unemployed	7	4	5		Father's Profession	Unemployed	10	4	2
		Officer	6	7	8			Officer	13	5	3
		Farmer	10	8	10			Farmer	18	7	3
		Laborer	8	7	12			Laborer	17	5	4
		Craft	3	3	3			Craft	5	2	2
	Characteristic of the place of residence	City	11	9	10		Characteristic of the place of residence	City	18	7	5
		County Town	9	9	14			County Town	22	7	4
		Village	13	10	14			Village	24	8	6

According to the data in the table, it is seen that the students have knowledge about the concept of biodiversity. It is seen that the knowledge levels of male and female students are close to each other, the level of knowledge increases as the class level increases and this rate is the highest in the 8th grade, the level of knowledge about the concepts in terms of father's profession is the highest in the children of farmers and the lowest in the children of crafts, and those who live in the village have more knowledge about the concept.

The relationship between knowledge of the concept of habitat and various variables is examined in Table 4. According to these data, it is observed that male students have higher levels of knowledge about the concept of habitat than female students, 7th grade students have higher levels of knowledge than other grades, the children of officers, farmers and laborers have higher levels of knowledge than the children of other occupational groups, and those residing in the county town have higher levels of knowledge about the concept of habitat than others.

Table 4 shows the distribution of responses to the concept of agricultural ecology. According to these data, it is seen that male students have higher knowledge than female students, 8th grade students have higher knowledge than other students, farmers' children have higher knowledge than others in terms of father's profession, and those residing in the village have higher knowledge than others.

When Table 4 is examined, it can be seen that the level of knowledge about the concept of conservation of plant differs in gender, class level, father's profession, and the characteristics of the place of residence. This difference is observed in favor of female students (32%), 8th grade students (20%), the children of farmers (18%), and those residing in villages (24%) in terms of gender, class level, father's profession, and place of residence variables regarding the concept of conservation of plant.

Discussion, Result and Suggestions

In this section, the comments and evaluations will be made regarding the research results presented in the previous section. In addition, these results will be discussed in the light of the relevant literature. According to the resultss of the research, it is seen that the students' knowledge of current agricultural concepts is at a high level. Comparisons are made below by examining whether students' understanding of certain contemporary agricultural concepts differs in various variables.

When we examine the awareness levels of the students about the concepts of agriculture through the gender variable, it is seen that the knowledge of the concepts of male students is higher than that of female students. It is seen that the knowledge levels of male and female students are close to each

other in the concepts of biodiversity, food safety and conservation of plant. The concepts that students have the most knowledge about are fighting drought (64%), conservation of plant (64%) and desertification (61%), while the concepts that they have the least knowledge about are heirloom (28%) and medicinal and aromatic plants. The concept in which male students state that they have a higher level of knowledge than other concepts is the fighting drought with 34%, and the concept about which they have the least knowledge compared to other concepts is heirloom with 15%. For female students, the concept that they consider themselves more knowledgeable is conservation of plant with a rate of 32%, while the concepts that they have the least knowledge are heirloom and agricultural development with a rate of 13%. Contrary to our study, Wallace (1995) states that there is no significant relationship between gender and agriculture literacy among the participants. However, it is noted that women score slightly higher than men, but there is no significant difference. According to Cannon, Broyles, Seibel, and Anderson (2009), the average scores of female students (M=4.25) are higher than the average scores of male students (M=4.11) in their research on agricultural literacy and career planning for gifted and talented students. The results of this study do not coincide with the results of our study. Sutphin and Newsom-Stewart (1992) state that they do not find a significant difference in agricultural and environmental awareness based on gender among 10th grade students. In another study by Terry Jr and Lawyer (1993) on university students' perceptions related to agriculture, they indicate that male students have more favorable perceptions than female students regarding food safety, animal welfare, farming and farm practices, and the use of drugs on animals. Williams (1990) discovers that the average agriculture literacy score of female students is higher in the 8th and 11th grades and lower in the 6th grade than the male students. Wallace (1995) states that female teachers residing in the county town have a higher average score of agricultural literacy levels than other groups and male teachers in his study.

When we examine the level of awareness of students about the concepts of agriculture through the class level variable, the concepts that students see themselves as more competent than other concepts at the class level are parallel to the gender variable. These concepts are the fighting drought (64%), conservation of plant (64%) and desertification (61%), while the concepts they say they have the least knowledge about are heirloom (28%), medicinal and aromatic plants and agricultural development (28%). The 5th grade is the class level with the least knowledge about other concepts, except for the concept of heirloom. Moreover, 5th graders have the highest rate of knowledge on conservation of plant (13%), fighting drought (13%), desertification (12%) and good agriculture (11%), and the least knowledge on genetically modified seeds (5%) and biodiversity (5%). 6th graders have more knowledge about concepts than 5th graders and less than 8th graders. The level of knowledge of the 6th and 7th graders about the concepts differs in the type of concept. The 6th graders have more knowledge about concepts related to sustainable agriculture, heirloom, water management, agriculture security, medicinal and aromatic plants, agricultural development, and agricultural ecology than 7th graders. Furthermore, the 6th graders have the highest knowledge rates in the concepts of conservation of plant (15%), fighting drought (15%), desertification (15%), and food safety (15%), with slightly less knowledge about genetically modified seeds (5%) and heirloom (8%). On the other hand, the 6th graders are the most knowledgeable class about the concepts of heirloom and medicinal and aromatic plants. The 7th graders, on the other hand, have the highest knowledge rates about these concepts compared to the 8th graders. The knowledge about the concepts of sustainable agriculture, heirloom, water management, agriculture security, medicinal and aromatic plants, agricultural development, and agricultural ecology is lower among the 5th and 6th graders. The 7th graders have the highest knowledge rates, with 16% knowledge about the concepts of conservation of plant, fighting drought, and desertification, and less knowledge about heirloom (5%), medicinal and aromatic plants (7%), and agricultural development (8%). The 8th graders are the most knowledgeable class regarding concepts other than heirloom and medicinal and aromatic plants. The 8th graders have the highest knowledge rates, with 20% knowledge about the concepts of conservation of plant, fighting drought, and good agriculture, and less knowledge about heirloom (8%) and medicinal and aromatic plants (9%). In our study, the students' knowledge of concepts generally increases as the class level increases. Similar to our study, Robert J. Birkenholz, Harris, and Pry (1994) state that the students' perceptions of agriculture increase as the class level increases. Williams (1990) evaluates agriculture literacy among the students at different class levels and discovers that the average scores are as follows: 5th graders

(27.78), 8th graders (32.83), and 11th graders (37.62). It is also noted that the students' agriculture literacy scores also increase as the class level increases. Igo (1998) does not find a significant difference in class levels in his case study on food and fiber systems literacy assessment.

When we examine the awareness levels of the students about the concepts of agriculture through the variable of father's profession, the students whose fathers are unemployed have the lowest level of knowledge about other concepts except for the concepts of agricultural ecology, sustainable agriculture and heirloom. The students consider themselves most knowledgeable and sufficient in the concepts of conservation of plant (10%), fighting drought (10%), and desertification (10%). On the other hand, they have the least knowledge about the concepts of genetically modified seeds (5%) and heirloom (5%). The knowledge of the concepts of sustainable agriculture, heirloom and agricultural ecology of the students whose father is an officer is lower than the children of other occupational groups, except for the children of crafts.

The children of officers, along with the children of farmers and laborers, have the highest level of knowledge about the concept of habitat. The students have expressed that they are more knowledgeable in the concepts of conservation of plant (13%), fighting drought (12%), and desertification (12%) compared to other concepts. On the other hand, they have the least knowledge about the concepts of heirloom (5%), agricultural ecology (6%), and sustainable agriculture (6%). The students whose fathers are farmers have a higher level of knowledge about concepts other than desertification, biodiversity, and habitat than others. The students whose fathers are farmers are most knowledgeable in the concepts of fighting drought (19%), conservation of plant (18%), and good agriculture (18%). On the other hand, they have less knowledge about the concepts of heirloom (9%), agricultural development (9%), biodiversity (9%), and medicinal and aromatic plants (9%) than other concepts. The students whose fathers are laborers have a higher level of knowledge about concepts related to desertification, biodiversity, and habitat than other occupational groups. The concepts that the students whose father is a laborer have more knowledge than other concepts are fighting drought (17%), conservation of plant (17%) and food safety (16%), on the other hand, the concepts they have the least knowledge about are heirloom (7%) and medicinal and aromatic plants (7%). The students whose father is craft are at a lower level than other occupational groups in terms of knowledge of the concepts. The students have the knowledge about the concepts of fighting drought (7%) and desertification (7%) within the concepts, while they know the least about heirloom (2%). Meischen and Trexler (2003) state in their study that even if the parents of the students live in rural areas, those who farm have more knowledge about agricultural concepts than those who do not.

When we examine the awareness levels of the students about agricultural concepts based on the variable of the place of their residence (city, county town, and village), it is found that the students residing in cities have a higher level of knowledge about sustainable agriculture, agricultural development, heirloom, human-induced soil degradation, genetically modified seeds, medicinal and aromatic plants, food safety, biodiversity, and agricultural ecology concepts than those residing in county towns. They, on the other hand, have a lower level of knowledge than the students residing in villages. The students living in the city have higher knowledge about the concept of habitat than those residing in the county town and village. The students living in city are the most proficient in the concepts of fighting drought (19%) and desertification (19%), while they have the least knowledge about the concept of heirloom (9%). The students residing in the county town have a higher rate of knowledge about the concept of habitat than those residing in the village. The students residing in county towns have lower knowledge about sustainable agriculture, agricultural development, heirloom, human-induced soil degradation, genetically modified seeds, medicinal and aromatic plants, food safety, biodiversity, and agricultural ecology concepts than those residing in city centers. However, they have a higher level of knowledge in concepts related to good agriculture, agricultural security, desertification, fighting drought, water management, and conservation of plant than those in cities. The concepts that the students residing in the county town have more knowledge about than other concepts are conservation of plant (22%), fighting drought (20%) and desertification (19%), on the other hand, the concepts they are less proficient with are heirloom (7%) and agricultural development (8%). The students residing in the village have a higher rate of knowledge about other concepts except the concept of habitat than those residing in the city and county town. The percentage

distributions of the students' knowledge levels are close to each other in the concepts of biodiversity and habitat. The students have more knowledge in the concepts of good agriculture (26%), fighting drought (25%), and conservation of plant (24%). On the other hand, they have less knowledge in the concepts of medicinal and aromatic plants (12%) and heirloom (13%) than other concepts. In parallel with our study, Robert J. Birkenholz et al. (1994) state that the students living in cities have less knowledge about agriculture. A similar study has been conducted by Martin J. Frick, Birkenholz, and Machtmes (1995), in which the respondents residing in rural areas state that they know more about agriculture than those residing in county towns. In another study, Martin J. Frick, Birkenholz, Gardner, et al. (1995) state that the students at high school residing in rural areas have more knowledge about the concept of agriculture and natural resources than those residing in cities. A study similar to ours is conducted by Hess and Trexler (2011), where they explore what K-12 students understand about the agricultural food system. They mention that the students living in cities without a traditional agricultural background do not raise any plants or animals. In another study conducted by Williams (1990), which target the students in 5^{th}, 8^{th}, and 11^{th} grades, it is mentioned that the students living in rural areas have higher average scores than those living in cities. This suggests that the rural students may have a better understanding of the subject matter being studied. Lewis (2013) compares the agricultural literacy of 3^{rd} and 4^{th} graders in urban and rural areas, and it is seen that the agriculture literacy scores of the students residing in rural areas are higher than those living in the city in his study. Miller (2019) states in his study for secondary school students that the agriculture literacy score of the students residing in rural areas is higher than those residing in city. Contrary to our study and the relevant literature, Pense and Leising (2004) state that the students enrolled in rural schools have less knowledge about agriculture than the students attending urban or suburban schools. In addition, Cannon et al. (2009), in their study on agricultural literacy and career planning of gifted and talented students, state that the students residing in cities show lower levels of agricultural literacy than those residing in rural areas.

When the variables related to these agricultural concepts are taken into consideration, it can be concluded that the children residing in the village generally have higher levels of knowledge about these concepts than male students, higher levels of knowledge about these concepts as class level increases, among those whose father is farmer than other occupational groups, and among the students residing in the village than the others. In line with the results obtained from our study;

The level of knowledge of the students residing in the city center and county town can be increased by presenting the content and application areas related to the concepts of agriculture. These comparisons can be made by conducting studies in regions and countries where different agricultural activities are carried out with different class levels.

License Information

Ethics Declaration: In this study, we declare that we have complied with the rules specified within the scope of the "Higher Education Institutions Scientific Research and Publication Ethics Directive," and we have not engaged in any actions listed under the heading "Actions Contrary to Scientific Research and Publication Ethics." We also confirm that there is no conflict of interest among the authors, all authors have contributed to the study, and in the case of any ethical violations, the responsibility lies with the article authors.

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