A RESEARCH IN
NON-FORMAL GASTRONOMY EDUCATION ON REMOVING MISCONCEPTIONS
BY CONCEPT MAPPING METHOD

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Tourism

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PREFACE

Various difficulties encountered in gastronomy education arise from the predominant use of lecture methods, which are frequently preferred in the education process. This situation makes it difficult to realize meaningful learning and achieve educational goals. In order to achieve meaningful learning and the desired level of education, new ways of learning need to be constantly discovered and developed.

The presence of many abstract and concrete concepts in education hinders the learning of subjects and thus the development of conceptual understanding. In the process of making sense of these concepts, students are often influenced by their daily experiences, what they hear and feel. This may lead to different inferences from the perspective advocated by scientists. Misconceptions arise when concepts are not sufficiently shaped in students' minds and a correct relationship cannot be established with existing schemas. Research shows that students and adults have many misconceptions and resist the elimination of these misconceptions. This resistance stems from the fact that the concepts held strongly and stubbornly in the minds of individuals resist change. Therefore, misconceptions are recognized as an important obstacle in gastronomy education. These misconceptions can make the acquisition of new concepts difficult or cause mislearning.

The issue of misconceptions is a frequently researched topic, especially in educational sciences. There are various techniques for identifying and eliminating existing misconceptions in the learning process. These techniques can be used not only to detect existing misconceptions but also to prevent the formation of misconceptions in the initial

learning phase. In this context, it is important for educators to be aware of students' learning difficulties and their causes before transferring their field knowledge to students. With this study conducted in the field of gastronomy, it is aimed to draw attention to the misconceptions of educators in cooking methods and to determine the misconceptions of students.

1. INTRODUCTION

The problem and for what purpose the relevant study was carried out, with what assumptions and under what limitations it was carried out are explained in the following headings.

- A concept map regarding cooking methods was created (ANNEX1).
- Cooking methods misconception detection test (CMMDT) has been developed (ANNEX2).
- The developed misconception detection test was applied to students as a pilot study after expert opinion and analyzed.

1.1. Aim of the Research

In the study, it was aimed to reveal the misconceptions of cookery programme students about cooking methods.

1.2. Problem Statement

The problem of the research was expressed as "What are the misconceptions of cookery programme students about cooking methods?".

1.3. Assumptions

1. During the research, students answered the two-stage test consisting of 19 questions about cooking methods sincerely and carefully.

2. The two-stage, 19-question test on cooking methods can reflect students' actual knowledge of "cooking" concepts.

3. The two-stage, 19-question test on cooking methods can reflect students' misconceptions about cooking methods.

1.4. Limitations

This study was limited to 58 students studying in Cookery Program in the 2023-2024 academic year.

2. LITERATURE

Concepts are mental tools that enable individuals to understand both the physical and social world. These mental tools help individuals to communicate and think in a meaningful way. It is important for an individual to know concepts in order to understand basic principles and solve problems. Concepts are the basic tools that improve an individual's ability to understand the world, communicate and think, and can facilitate learning by dividing large information into more meaningful parts (Özdemir, 2008).

Individuals begin to observe their environment and the natural world from the moment they are born. These observations lead individuals to form their opinions, thoughts, and opinions about events. Individuals may sometimes contradict scientifically accepted concepts with these ideas, thoughts and opinions that they have acquired through their own experiences. The differences in meaning that arise as a result of these contradictions are called misconceptions (Sewell, 2002).

Misconceptions are the situation where concepts appear in the minds of individuals in a different way, deviating from their scientific definitions. It generally refers to the semantic complexities that arise in individuals' learning processes and can be corrected through education. In this context, it may be important to pay attention to such misconceptions in educational processes and to make efforts to ensure that students understand scientific concepts correctly (Eryılmaz & Sürmeli, 2002).

"Student" is not the only factor that causes misconceptions in education. In addition, "course instructor/teacher" and "course material" are also very important elements. Misconceptions are

triggered by reasons such as the faculty member not having sufficient field knowledge, giving too much attention to details in the lecture and using wrong methods, not being able to establish relationships between concepts, and not being able to concretize abstract concepts. In addition, textbooks contain incomplete or incorrect information and the subjects are not listed correctly. Reasons such as presenting it as disconnected from daily life also cause misconceptions (Kılınç, 2022).

Identifying and eliminating misconceptions is a subject that is mainly emphasized in science. In this context, misconceptions of students at various levels in branches such as mathematics, chemistry, biology and physics are identified and some methods are tried to eliminate these misconceptions. As innovative educational methods of research; project-based education model (Dilşeker, 2008; Seloni, 2005), problem-based education model (Bayram, 2010; Yılmazel, 2021; Yurd, 2007), inquiry-based education model (Deveci, 2020; Göksu, 2011) and the 5E-7E teaching model (Caner, 2008; Çekiç-Toroslu, 2011; Gül, 2011; Saka, 2006; Yenil, 2020; Türker, 2020). However, it has been understood that there are a limited number of studies addressing misconceptions in the fields of gastronomy and cookery. The studies in question are pioneering studies in both national and international gastronomy literature by Sarıoğlan, Avcıkurt and Sezen (2020) and Sarıoğlan, (2021). In related studies, special training methods were used to eliminate misconceptions about cooking methods and chopping techniques and the effectiveness of these methods was tried to be determined. When the studies on determining misconceptions were examined, it was seen that a total of 59 theses were written at master's and doctoral levels between 2001 and 2023.

In his study, Demirci (2015) tried to detect students' misconceptions by using a concept survey, concept test and

students' concept maps. In addition, it aimed to compare the effect of the concept maps method with the traditional learning method in eliminating these misconceptions. The study used a mixed research design; The quantitative dimension was evaluated using a quasi-experimental design with a pretest-posttest control group, and the qualitative dimension was evaluated using the descriptive analysis method. While the subject of protein synthesis was taught with a teaching method based on concept maps and guide materials in the experimental group, the traditional teaching method was used in the control group. In the data collection process, concepts survey, concept test, achievement test, students' concept maps and opinion survey regarding the concept maps method were used. The research aimed to examine the concept maps method and compare it with the traditional learning method in order to evaluate students' conceptual understanding of protein synthesis and to eliminate misconceptions.

In his study, Atmaca Aksoy (2022) calculated the percentages of prospective teachers' scientific knowledge, lack of knowledge, positive misconceptions and negative misconceptions about global warming by using the global warming four-stage misconception diagnostic test. According to the analysis results, science knowledge. The test used to determine prospective teachers' misconceptions about global warming showed that the students had more than 10% misconceptions for each question and their scientific knowledge was not sufficient. The study identifies pre-service teachers' misconceptions about global warming and emphasizes the need to develop a more effective teaching strategy on this subject.

In his study, Şemet (2023) aimed to identify and correct the misconceptions of university students from different disciplines about the phases of the Moon and eclipses. The research was

designed as a detection and situation analysis study and a combination of survey and case study methods were used. Data collection tools used to identify misconceptions include a four-stage astronomy concept test created from the literature and a semi-structured interview. Through these tools, misconceptions about the phases of the Moon and eclipses were determined.

In his study, Gürbüz (2023) aimed to determine the misconceptions of prospective teachers who took the measurement and evaluation course in education in the field of measurement and evaluation. In this direction, he developed a 3-stage multiple choice diagnostic test consisting of 22 items and applied this test to 132 teacher candidates studying in various departments of Kocaeli University Faculty of Education. During the development phase of the test, the first stage of the test was created in a form with 4 options, the second stage with 4 options and the last stage with 2 options.

In his study, Ünsal (2019) aimed to determine the misconceptions of teacher candidates studying in the field of Science Education about gas pressure and to identify these misconceptions, knowledge deficiencies and scientific knowledge levels. For this purpose, a four-stage Gas Pressure Misconception Diagnostic Test (GBKYTT) has been developed. The research revealed that prospective teachers' scientific knowledge levels are insufficient and that they are insufficient to answer questions on this subject correctly, explain their answers, and be confident in their answers. This information is important in terms of understanding the conceptual difficulties that prospective teachers encounter in a particular subject in science education and developing teaching strategies that will help them overcome these difficulties.

In his study, Kartal (2017) aimed to determine science teacher candidates' level of understanding of basic chemistry

concepts and their misconceptions on this subject. The research was conducted on 260 students studying in the Science Teaching Program at Necmettin Erbakan University Ahmet Keleşoğlu Faculty of Education. The survey administered to students consists of two parts. The first part contains personal information of teacher candidates and consists of 7 questions. The second part contains a total of 87 scientifically and logically correct and incorrect sentences in order to evaluate the prospective teachers' understanding of some concepts related to chemistry. Additionally, three options were presented: "I agree", "I disagree" and "I have no opinion" to determine the opinions of prospective teachers regarding these sentences. The obtained data were examined statistically, and statistical data, results and suggestions were presented, especially focusing on the misconceptions that emerged in the survey on basic chemistry subjects.

In his study, Bulut (2014) aimed to determine the understanding levels and misconceptions of Social Studies Teaching program students about the "Structure of the World" subject of the General Physical Geography course. The research was conducted with 100 teacher candidates studying in the 2nd, 3rd and 4th grades of Recep Tayyip Erdoğan University Faculty of Education Social Studies Teaching program in the 2013-2014 academic year. The first focus of the research was on the misconceptions and comprehension difficulties that students encountered while learning the concepts. In the study designed using the descriptive survey model, the researcher evaluated the knowledge levels of the students with the "Concept Interview Form", which included concepts such as "earthquake", "rock", "plate", "plate movement", "epyrogenesis", "orogenesis". According to the results of the research, it was determined that teacher candidates had many misconceptions and difficulties

in understanding the mentioned concepts. In the last part of the research, opinions were presented on the possible causes of misconceptions and comprehension difficulties and various suggestions were made for educators and program developers. These recommendations can be a valuable resource for improving educational strategies and programs to improve students' understanding of these topics.

In his study, Orçan (2013) aimed to determine the misconceptions that occur in the minds of postgraduate students at educational sciences institutes about concepts frequently used in the scientific research process and to examine the relationship between these misconceptions and the students' research competencies. The study group of the research consists of a total of 110 students, 58 of whom are master's degrees and 52 of whom are doctoral students, studying at the Institutes of Educational Sciences of Ankara and Gazi Universities. The data collection tools used in the research include the 12-item Research Concepts Test (AKT) developed by the researcher and the 43-item Cognitive-Psychomotor Competences in Research Scale (CISS) developed by Büyüköztürk (1996). According to the research findings, it was determined that the concept in which students had the most misconceptions was related to "test adaptation", but no significant difference was found in students' misconceptions according to their postgraduate education level. Additionally, no significant relationship was found between students' research competencies and misconception scores.

3. METHOD

At this stage, information about the research model, population, sample, data collection process, data collection tools and analyzes will be presented.

3.1. Research Model

This research, which was conducted to determine the misconceptions of culinary program students about cooking methods, is a quantitative study. In this study, the survey method, one of the quantitative research methods, was used.

3.2. Population and Sample of the Research

The population of the research is students who continue their associate degree education in the culinary programs of universities in Turkey. The sample of the research is 58 students studying Cookery Program. No class level distinction was made in the research sample. The sample includes first and second grade students. The research sample was created using easily accessible sampling method.

3.3. Collection of Data

The data of the research were collected in the determined culinary program in the fall semester of the 2023-2024 academic year. All students participated in the study voluntarily. The misconception detection test was used as a data collection tool in the study. The data collection tool used was developed by the researcher within the scope of the study. The researcher controlled the process as a supervisor in the classroom environment during the test application.

3.4. Validity-Reliability

"Test-Retest Method" was applied to measure the reliability of the two-stage cooking methods misconception detection test consisting of a total of 19 items applied in the research. The test was re-administered to the students three weeks apart. As a result of the analysis, the reliability of the test was found to be high with a correlation value of 0.88. Difficulty and item discrimination indexes of 19 items in the Concept Test were analyzed with the ITEMAN 4.5 (Item and Test Analysis) Program. Analysis results are given in Table 3.1.

Table 3.1. Item Statistics

Item	Item Difficulty	Item Discrimination
I1	0,95	-0,09
I2	0,26	0,03
I3	0,22	0,04
I4	0,05	0,05
I5	0,91	0,09
I6	0,14	0,09
I7	0,59	0,21
I8	0,19	0,24
I9	0,60	0,29
I10	0,62	0,29
I11	0,95	0,31
I12	0,71	0,33
I13	0,50	0,36
I14	0,69	0,36
I15	0,60	0,36
I16	0,33	0,37
I17	0,17	0,39
I18	0,71	0,41
I19	0,90	0,43

As a result of the analyses, it is seen that the majority of the items' difficulties are between 0.50 and 0.95 (Table 3.1.).

Table 3.2. Distribution of 19 Items in the Test According to Difficulty Scale

Item Difficulty Scale	Value Range	Item Number in Test
Difficult	0,00 - 0,20	I6, I11, I16, I18
Medium Difficult	0,21 - 0,40	I2, I8, I13
Middle	0,41 - 0,60	I3, I10, I12, I15
Medium Easy	0,61 - 0,80	I4, I5, I7, I17
Easy	0,81 - 1,00	I1, I9, I14 I19

When the difficulty values of the items in the test were examined, the difficulty scale of the items showed a balanced distribution (Table 3.2). Items 6, 11, 16 and 18, which have a high degree of difficulty, will be rearranged for the next test.

Table 3.3. Distribution of 19 Items in the Test According to Discrimination Scale

Item Difficulty Scale	Value Range	Item Number in Test
Weak	0,00-0,20	I1, I6, I8, I13, I18, I19
Should be improved	0,21-0,29	I7, I10, I12, I16
Very good	0,30-1,00	I2, I3, I4, I5, I9, I11, I14, I15, I17

When the discrimination indexes of the items included in the study are examined, it is seen that a significant part of them is above the value of 0.30. Items with a discrimination value of less than 0.20 will be rearranged for the next test.

3.5. Data analysis

A two-stage multiple-choice diagnostic test was used to identify misconceptions. Students selected the answers they gave in the first stage of the test and the reasons they chose for these answers in the second stage. These answers were evaluated on an item basis in the findings section. During the determination of misconceptions, the combinations of content and justification options chosen by the student were examined. If the correct answer was given in both stages of the test, 1 (one) score was given, and if the wrong option was chosen in either or both stages of the test, 0 (zero) score was given. Apart from this scoring, the student's answers and percentages to the first stage of the test were determined and tabulated. In these tables, "N" is the number of students who chose the relevant option, and "%" is the proportion of students who chose the relevant option.

4. FINDINGS

In this section, the findings obtained as a result of the analysis of the "Cooking Methods Misconception Identification Test" applied to the students of the culinary program are presented respectively, together with their comments.

Table 4.1. Table for Correct Answers to the First and Both Stages of CMMDT

Question No	Cooking Method	Phase I		Both Stages	
		f	%	f	%
1	Boiling	53	91,4	34	58,6
2	Blanching	19	32,8	8	13,8
3	Poaching	29	50	17	29,3
4	Simmering	40	69	11	19
5	Stewing	41	70,7	14	24,1
6	Braising	3	5,2	1	1,7
7	Steaming	36	62,1	29	50
8	Roasting	15	25,9	7	12,1
9	Bain-Marie	55	94,8	43	74,1
10	Microwave	34	58,6	20	34,5
11	Infrared	10	17,2	8	13,8
12	Sous Vide	35	60,3	24	41,4
13	Stir Frying	13	22,4	7	12,1
14	Deep Frying	52	89,7	48	82,8
15	Grilling	35	60,3	10	17,2
16	Broiling	11	19,0	8	13,8
17	Shallow Fat Frying	41	70,7	32	55,2
18	Sauteing	8	13,8	4	6,9
19	Baking	55	94,8	28	48,3

The frequency value and percentage of the correct answers given by the culinary students to the first and both stages of the questions in the CMMDT are presented in Table 4.1. When the table is examined, in Phase I, the students' correct answer percentages are highest in the Bain-Marie and Baking methods, with a rate of 94.8%. When the correct answers given in both stages are examined, the cooking method with the most misconceptions is the Braising and Sauteing method. The cooking methods with the lowest misconceptions are Deep Frying and Bain-Marie method.

4.1. Findings from Question 1

1. "The ingredients are added to boiling water at 100°C and the cooking process is carried out." Which of the following cooking methods could the expression refer to?	**Because**
A. Pre-boiling (Blanching)	A. In the boiling method, cooking can be done by starting with both boiling water and cold water.
B. Boiling	B. In cooking in an aqueous environment, the degree to which the water or cooking liquid is heated determines the method applied.
C. Simmering	C. When boiling vegetables, the amount of water should be enough to cover the vegetables.
D. Poaching in Non-Boiling Hot Water	D. Vegetables, starchy foods and meats are suitable for cooking with this method.
E. Steaming	E. The method of boiling at 85-96°C is called low temperature simmering.

Figure 4.1. CMMDT Question 1

In this question, an attempt was made to determine the misconception regarding the Boiling method. The correct

answer in the first stage of the question is option B, and in the second stage the correct answer is option B. The amount and rates of students' preference for the options of the question are given in table 4.2. In the first stage of the question, students chose option B, which is 91.38% correct. In the second stage, option B, which was correct with a rate of 63.79%, was preferred (Table 4.2.).

Table 4.2. Amount and rate of students choosing the options of question 1

	Preferred Option	A	B	C	D	E	Blank	Total
Stage I	**N**	3	53	1	1	0	0	58
	%	5,17	91,38	1,72	1,72	0,00	0,00	100
Stage II	**N**	16	37	1	0	2	2	58
	%	27,59	63,79	1,72	0,00	3,45	3,45	100

Students' misconceptions about the boiling method are given in table 4.3. Three students thought that the proposition given in Stage I of the question was related to the blanching method (Table 4.3.).

Table 4.3. Students' misconceptions about the boiling method

Misconception	f	%
Pre-boiling (Blanching)	3	5,17
Boiling on Low Heat (Simmering)	1	1,72
Poaching in Non-Boiling Hot Water	1	1,72

4.2. Findings from Question 2

2."One of the purposes of this method is to preserve the color of the vegetables." Which of the following cooking methods could the expression refer to?	**Because**
A. Simmering	A. Various sauces and soups prepared using meat broths are cooked by the simmering method.
B. Pre-boiling (Blanching)	B. This method is generally used for vegetables such as legumes, potatoes and carrots that require a long time to cook.
C. Steaming	C. The lid of the pot is closed and the lid is kept closed during cooking.
D. Boiling	D. In this method, materials are added to water at around 100 °C and kept for a short time.
E. Poaching in Non-Boiling Hot Water	E. In this method, foods that may be damaged by boiling are cooked.

Figure 4.2. CMMDT 2nd Question

In this question, an attempt was made to determine the misconception regarding the Pre-Blanching method. The correct answer in the first stage of the question is option B, and in the second stage the correct answer is option D. The amount and rates of students choosing the options of the question are in the table.

It is given in 4.4. In the first stage of the question, students chose option B, which is correct with a rate of 32.76%. In the second stage, option D, which was correct with a rate of 17.24%, was chosen (Table 4.4.).

Table 4.4. Amount and rate of students choosing the options of the 2nd question

	Preferred Option	**A**	**B**	**C**	**D**	**E**	**Blank**	**Total**
Stage I	**N**	8	19	22	1	7	1	58
	%	13,79	32,76	37,93	1,72	12,07	1,72	100
Stage II	**N**	1	5	7	10	33	2	58
	%	1,72	8,62	12,07	17,24	56,90	3,45	100

Students' misconceptions about the Pre-Blanching method are given in table 4.5. Twenty-two students thought that the proposition given in Stage I of the question was related to the Steaming method (Table 4.5.).

Table 4.5. Students' misconceptions about the Pre-Blanching method

Misconception	f	%
Steaming	22	37,93
Boiling on Low Heat (Simmering)	8	13,79
Poaching in Non-Boiling Hot Water	7	12,07
Boiling	1	1,72

4.3. Findings from Question 3

3. "It is a cooking method applied in a liquid at 60 - 88 °C, Paying attention to temperature control." Which of the following cooking methods could the expression refer to? A. Steaming B. Simmering C. Poaching D. Boiling E. Blanching	**Because** A. This method reduces the nutritional parts and colors of vegetables helps protect. B. This method is cooking in boiling, non-boiling water method. C. In this method, boiled food is ensured to absorb water. D. In this method, hardness and firmness occur on the outer surface of the food. E. This method is generally used for vegetables such as legumes, potatoes and carrots that require a long time to cook.

Figure 4.3. CMMDT 3rd Question

In this question, an attempt was made to determine the misconception regarding the Poaching method in Non-Boiling Hot Water. The correct answer in the first stage of the question is option C, and in the second stage the correct answer is option B. The amount and rates of students' preference for the options of the question are given in table 4.6. In the first stage of the question, students chose option C, which is 50% correct. In the second stage, option B, which was correct with a rate of 37.93%, was preferred (Table 4.6.).

Table 4.6. Amount and rate of students choosing the options of the 3rd question

	Preferred Option	A	B	C	D	E	Blank	Total
Stage I	**N**	2	23	29	0	4	0	58
	%	3,45	39,66	50,00	0,00	6,90	0,00	100
Stage II	**N**	23	22	4	2	5	2	58
	%	39,66	37,93	6,90	3,45	8,62	3,45	100

Misconceptions about the Poaching method in Non-Boiling Hot Water are given in table 4.7. Twenty-three students thought that the proposition given in Stage I of the question was related to the Simmering method (Table 4.7.).

Table 4.7. Students' misconceptions about the Poaching method in non-boiling hot water

Misconception	f	%
Boiling on Low Heat (Simmering)	23	39,66
Pre-boiling (Blanching)	4	6,90
Steaming	2	3,45

4.4. Findings from Question 4

4. "For delicate meats and vegetables, low temperatures are used to prevent damage and wear caused by boiling at high temperatures." Which of the following cooking methods could the expression refer to?	**Because**
A. Poaching	A. In this method, cooking should be started with little water.
B. Blanching	B. Which cooking water to use on vegetables for this method. It should be determined well.
C. Steaming	C. Boiling is done at 88-89°C.
D. Simmering	D. This method is generally used for ingredients that take a short time to cook.
E. Boiling	E. Vegetables cooked in this method can be used in making sauces and soups.

Figure 4.4. CMMDT 4th Question

In this question, an attempt was made to determine the misconception regarding the Simmering method. The correct answer in the first stage of the question is option D, and in the second stage the correct answer is option C. The amount and rates of students choosing the options of the question are in the table.

It is given in 4.8. In the first stage of the question, students chose option D, which is 68.97% correct. In the second stage, option C, which was correct with a rate of 29.31%, was preferred (Table 4.8.).

Table 4.8. Amount and rate of students choosing the options of the 4th question

	Preferred Option	A	B	C	D	E	Blank	Total
Stage I	N	9	5	3	40	0	1	58
	%	15,52	8,62	5,17	68,97	0,00	1,72	100
Stage II	N	10	7	17	17	5	2	58
	%	17,24	12,07	29,31	29,31	8,62	3,45	100

Students' misconceptions about the Simmering method are given in table 4.9. Nine students thought that the proposition given in Stage I of the question was related to the Poaching method in Non-Boiling Hot Water (Table 4.9.).

Table 4.9. Students' misconceptions about the Simmering method

Misconception	f	%
Poaching in Non-Boiling Hot Water	9	15,52
Pre-boiling (Blanching)	5	8,62
Steaming	3	5,17

4.5. Findings from Question 5

5. "The ingredients are cooked over low heat, allowing them to release their own juice or adding a little water." Which of the following cooking methods could the expression refer to?

A. Poaching

B. Braising

C. Stewing

D. Simmering

E. Roasting

Because

A. Foods placed in the perforated gastronome are cooked with this method.

B. The important element in this technique is cooking water.

C. This method is generally used for delicate materials.

D. In this method the products cooked are first roasted and water is added.

E. In this method, cooking should be started with little water.

Figure 4.5. CMMDT 5th Question

An attempt was made to determine the misconception regarding the Stewing method. The correct answer in the first stage of the question is option C, and in the second stage the correct answer is option B. The amount and rates of students' preference for the options of the question are given in table 4.10. In the first stage of the question, students chose option C, which is 70.69% correct. In the second stage, option B, which was correct with a rate of 27.59%, was chosen (Table 4.10.).

Table 4.10. Amount and rate of students choosing the options of the 5th question

	Preferred Option	A	B	C	D	E	Blank	Total
Stage I	**N**	0	17	41	0	0	0	58
	%	0,00	29,31	70,69	0,00	0,00	0,00	100
Stage II	**N**	1	16	3	22	16	0	58
	%	1,72	27,59	5,17	37,93	27,59	0,00	100

Students' misconceptions about the Stewing method are given in table 4.11. Seventeen students thought that the proposition given in Stage I of the question was related to the Braising method on low heat (Table 4.11).

Table 4.11. Students' misconceptions about the Stewing method

Misconception	f	%
Cooking in a little water over low heat (Braising)	17	29,31

4.6. Findings from Question 6

6. "It is a method generally applied to thicken sauces and increase flavor." Which of the following cooking methods could the expression reffer to?	**Because**
A. Simmering	A. In this method cooking is faster with the high and moist heat of the steam.
B. Braising	B. Meat, fish and chicken broths are used as cooking water.
C. Steaming	C. This technique uses high temperature.
D. Stewing	D. In this method, the metarial is dhydrated and used with appropriate food.
E. Sauteing	E. In this method, cooking should be started with little water.

Figure 4.6. CMMDT 6th Question

In this question, an attempt has been made to determine the misconception regarding the Braising method. The correct answer in the first stage of the question is option B, and in the second stage the correct answer is option E. The amount and rates of students' preference for the options of the question are given in table 4.12. In the first stage of the question, students chose option B, which was correct with a rate of 5.17%. In the second stage, option E, which was correct with a rate of 12.07%, was preferred (Table 4.12.).

Table 4.12. Amount and rate of students choosing the options of the 6th question

	Preferred Option	A	B	C	D	E	Blank	Total
Stage I	**N**	16	3	0	13	26	0	58
	%	27,59	5,17	0,00	22,41	44,83	0,00	100
Stage II	**N**	3	16	8	22	7	2	58
	%	5,17	27,59	13,79	37,93	12,07	3,45	100

Students' misconceptions about the Braising method on low heat are given in table 4.13. Twenty-six students thought that the proposition given in Stage I of the question was related to the Sauteing method (Table 4.13.).

Table 4.13. Students' misconceptions about the Braising method on low heat and little water

Misconception	f	%
Sauteing	26	44,83
Boiling on Low Heat (Simmering)	16	27,59
Cooking in Own Juice (Stewing)	13	22,41

4.7. Findings from Question 7

7. " In this method, the nutritional value and color of the dishes are preserved." Which of the following cooking methods could the expression refer to?	**Because**
A. Sauteing	A. This method uses a small amount of oil.
B. Simmering	B. The cooking process takes place at low temperature.
C. Steaming	C. In this method, the ingredients are cooked by steaming them directly.
D. Cooking in a little water over low heat (Braising)	D. The dry hot air used in this method preserves the structure of the food.
E. Stewing	E. The use of alkaline water is common in this method.

Figure 4.7. CMMDT 7th Question

In this question, an attempt was made to determine the misconception regarding the Steaming method. The correct answer in the first stage of the question is option C, and in the

second stage the correct answer is option C. The amount and rates of students' preference for the options of the question are given in table 4.14. In the first stage of the question, students chose option C, which is 62.07% correct. In the second stage, option C, which was correct with a rate of 53.45%, was preferred (Table 4.14.).

Table 4.14. Amount and rate of students choosing the options of the 7th question

	Preferred Option	A	B	C	D	E	Blank	Total
Stage I	**N**	2	5	36	9	6	0	58
	%	3,45	8,62	62,07	15,52	10,34	0,00	100
Stage II	**N**	2	10	31	14	1	0	58
	%	3,45	17,24	53,45	24,14	1,72	0,00	100

Students' misconceptions about the Steaming method are given in table 4.15. Nine students thought that the proposition given in Stage I of the question was related to the Braising method on low heat (Table 4.15).

Table 4.15. Students' misconceptions about the Steaming method

Misconception	f	%
Cooking in a little water over low heat (Braising)	9	15,52
Cooking in Own Juice (Stewing)	6	10,34
Boiling on Low Heat (Simmering)	5	8,62
Sauteing	2	3,45

1.8. Findings from Question 8

8. " Cooking is done with hot air without adding water. Meat products are widely used in this method." Which of the following cooking methods could the expression refer to?	**Because**
A. Stewing	A. In this method, cooking time should be kept short.
B. Sauteing	B. It is sufficient to apply its own juice or oil on the ingredient during the cooking process.
C. Baking	C. Ingredients can be flavored before cooking.
D. Roasting	D. The internal temperature of the cooked material is important.
E. Braising	E. In this method, pre-cooking process is applied.

Figure 4.8. CMMDT 8th Question

In this question, an attempt was made to determine the misconception regarding the Roasting method. The correct answer in the first stage of the question is option D, and in the second stage the correct answer is option B. The amount and rates of students' preference for the options of the question are given in table 4.16. In the first stage of the question, students chose option D, which is correct with a rate of 25.86%. In the second stage, option B, which was correct with a rate of 51.72%, was chosen (Table 4.16).

Table 4.16. Amount and rate of students choosing the options of the 8th question

	Preferred Option	A	B	C	D	E	Blank	Total
Stage I	**N**	8	4	31	15	0	0	58
	%	13,79	6,90	53,45	25,86	0,00	0,00	100
Stage II	**N**	2	30	7	13	4	2	58
	%	3,45	51,72	12,07	22,41	6,90	3,45	100

Students' misconceptions about the Roasting method are given in table 4.17. Thirty-one students thought that the proposition given in Stage I of the question was related to the Baking method (Table 4.17).

Table 4.17. Students' misconceptions about the boiling method

Misconception	f	%
Baking	31	53,45
Roasting in the Oven	15	25,86
Cooking in Own Juice (Stewing)	8	13,79
Sauteing	4	6,90

4.9. Findings from Question 9

9. "It is a method of cooking delicate foods by placing another container over a container containing hot water." Which of the following cooking methods could the expression refer to? A. Microwave B. Bain-Marie C. Baking D. Sauteing E. Braising	**Because** A. It minimizes health risks by pasteurizing food. B. It is one of the fast cooking methods. C. There is a risk of products burning at high temperatures. D. Food cooks or coagulates with the heat from the water. E. This method is used for pastries.

Figure 4.9. CMMDT Question 9

In this question, an attempt was made to determine the misconception about the Bain-Marie method. The correct answer in the first stage of the question is option B, and in the

second stage the correct answer is option D. The amount and rates of students' preference for the options of the question are given in table 4.18. In the first stage of the question, students chose option B, which is 94.83% correct. In the second stage, option D, which was correct with a rate of 77.59%, was chosen (Table 4.18).

Table 4.18. Amount and rate of students choosing the options of the 9th question

	Preferred Option	A	B	C	D	E	Blank	Total
Stage I	**N**	0	55	0	1	1	1	58
	%	0,00	94,83	0,00	1,72	1,72	1,72	100
Stage II	**N**	4	0	7	45	0	2	58
	%	6,90	0,00	12,07	77,59	0,00	3,45	100

Students' misconceptions about the Bain-Marie method are given in table 4.19. Two students thought that the proposition given in Stage I of the question was related to the Sauteing and Braising methods (Table 4.19).

Table 4.19. Students' misconceptions about the boiling method

Misconception	f	%
Sauteing	1	1,72
Cooking in a little water over low heat (Braising)	1	1,72

4.10. Findings from Question 10

10. "In this method, there is no boiling, frying and roasting" Which of the following cooking methods could the expressions refer to?	**Because**
A. Stir Fyring	A. Food should not be in large pieces.
B. Braising	B. It is used to thaw or heat frozen products.
C. Sous – Vide	C. Heat transfer occurs through conduction.
D. Microwave	D. The water ratio of the products is important in the application of the method.
E. Bain-Marie	E. This method can only be used on vegetables.

Figure 4.10. CMMDT 10.Soru

In this question, an attempt was made to determine the misconception about the Microwave method. The correct answer in the first stage of the question is option D, and in the second stage the correct answer is option B. The amount and rates of students' preference for the options of the question are given in table 4.20. In the first stage of the question, students chose option D, which is correct with a rate of 58.62%. In the second stage, option B, which was correct with a rate of 41.38%, was preferred (Table 4.20.).

Table 4.20. Amount and rate of students choosing the options of the 10th question

	Preferred Option	**A**	**B**	**C**	**D**	**E**	**Blank**	**Total**
Stage I	**N**	0	1	10	34	11	2	58
	%	0,00	1,72	17,24	58,62	18,97	3,45	100
Stage II	**N**	2	24	25	2	0	5	58
	%	3,45	41,38	43,10	3,45	0,00	8,62	100

Students' misconceptions about the Microwave method are given in table 4.21. Eleven students thought that the proposition given in Stage I of the question was related to the Bain-Marie method (Table 4.21.).

Table 4.21. Students' misconceptions about the Microwave method

Misconception	f	%
Bain-Marie	11	18,97
Vacuum Cooking (Sous – Vide)	10	17,24
Cooking in a little water over low heat (Braising)	1	1,72

4.11. Findings from Question 11

11. "It is mostly used in holding units to keep food warm" Which of the following cooking methods could the expressions refer to?	**Because**
A. Bain-Marie	A. It is only suitable for cooking small quantities.
B. Infrared	B. It can be used in cooking potatoes and vegetables.
C. Sous – Vide	C. In this method, foods are cooked by sending infrared rays on them.
D. Stir Fyring	D.This method is not capable of industrial or large-scale production.
E. Microwave	E. This method is used to melt chocolate and make sauce.

Figure 4.11. CMMDT Question 11

In this question, an attempt was made to determine the misconception regarding the Cooking with Infrared Rays method. The correct answer in the first stage of the question is option B, and in the second stage the correct answer is option

C. The amount and rates of students' preference for the options of the question are given in table 4.22. In the first stage of the question, students chose option B, which was correct with a rate of 17.24%. In the second stage, option C, which was correct with a rate of 22.41%, was preferred (Table 4.22).

Table 4.22. Amount and rate of students choosing the options of the 11th question

	Preferred Option	A	B	C	D	E	Blank	Total
Stage I	**N**	40	10	0	0	8	0	58
	%	68,97	17,24	0,00	0,00	13,79	0,00	100
Stage II	**N**	6	0	13	8	26	5	58
	%	10,34	0,00	22,41	13,79	44,83	8,62	100

Students' misconceptions about the Cooking with Infrared Rays method are given in table 4.23. Forty students thought that the proposition given in Stage I of the question was related to the Bain-Marie method (Table 4.23.).

Table 4.23. Students' misconceptions about the boiling method

Misconception	f	%
Bain-Marie	40	68,97
Microwave	8	13,79

4.12. Findings from Question 12

12. " It is the cooking of food in tanks with water circulation without contact with liquid." Which of the following cooking methods could the expression refer to?	**Because**
A. Sous – Vide	A. The cooking process takes place between 57-85 °C for varying periods of time depending on the quality and quantity of the material.
B. Bain-Marie	B. Food items are placed in heat-resistant plastic bags in portions and cooked after removing air.
C. Infrared	C. In this method, ovens that provide both heat and steam circulation can be used.
D. Deep Frying	D. It is a method in which mostly large pieces of food are cooked.
E. Microwave	E. The amount of oil in the cooking process should be very low.

Figure 4.12. CMMDT Question 12

In this question, an attempt was made to determine the misconception regarding the Vacuum Cooking (Sous Vide) method. The correct answer in the first stage of the question is option A, and in the second stage the correct answer is option B. The amount and rates of students' preference for the options of the question are given in table 4.24. In the first stage of the question, students chose option A, which is 60.34% correct. In the second stage, option B, which was correct with a rate of 43.10%, was preferred (Table 4.24).

Table 4.24. Amount and rate of students choosing the options of the 12th question

	Preferred Option	A	B	C	D	E	Blank	Total
Stage I	**N**	35	14	8	0	1	0	58
	%	60,34	24,14	13,79	0,00	1,72	0,00	100
Stage II	**N**	13	25	12	1	0	7	58
	%	22,41	43,10	20,69	1,72	0,00	12,07	100

Students' misconceptions about the Vacuum Cooking (Sous Vide) method are given in table 4.25. Fourteen students thought that the proposition given in Stage I of the question was related to the Bain-Marie method (Table 4.25.).

Table 4.25. Students' misconceptions about the Vacuum Cooking (Sous Vide) method

Misconception	f	%
Bain-Marie	14	24,14
Cooking with Infrared Rays (Infrared)	8	13,79
Microwave	1	1,72

4.13. Findings from Question 13

13. "It is a cooking method applied in a pan with no or very little oil, first at high and then at low heat, in its own juices, without closing the lid." Which of the following cooking methods could the expression refer to?

A. Shallow Fat Frying

B. Sauteing

C. Stir Fyring

D. Deep Frying

E. Baking

Because

A. Once the oil is hot, the food should be added to the pan.

B. In this method, constant high temperature is not applied.

C. It is a method in which small and equal pieces of food are cooked.

D. Any type of oil can be used in cooking.

E. The temperature should be between 160–240 °C.

Figure 4.13. CMMDT Question 13

In this question, an attempt was made to determine the misconception regarding the Stir Frying method. The correct answer in the first stage of the question is option C, and in the second stage the correct answer is option A. The amount and rates of students' preference for the options of the question are given in table 4.26. In the first stage of the question, students chose option C, which is correct with a rate of 22.41%. In the second stage, option A, which was correct with a rate of 29.31%, was chosen (Table 4.26).

Table 4.26. Amount and rate of students choosing the options of the 13th question

	Preferred Option	A	B	C	D	E	Blank	Total
Stage I	**N**	8	35	13	0	2	0	58
	%	13,79	60,34	22,41	0,00	3,45	0,00	100
Stage II	**N**	17	11	22	1	3	4	58
	%	29,31	18,97	37,93	1,72	5,17	6,90	100

Students' misconceptions about the Stir Frying method are given in table 4.27. Thirty-five students thought that the proposition given in Stage I of the question was related to the Sauteing method (Table 4.27.).

Table 4.27. Students' misconceptions about the Stir Frying method

Misconception	f	%
Sauteing	35	60,34
Shallow Fat Frying	8	13,79
Baking	2	3,45

4.14. from Question 14

14. "In this method, the food fried in oil has very little contact with air." Which of the following cooking methods could the expression refer to?	**Because**
A. Deep Frying	A. Frying is done in deep containers with plenty of oil.
B. Shallow Fat Frying	B. Before cooking in oil, the frying pan and oil are preheated.
C. Stir Fyring	C. Too little oil will cause it to burn quickly.
D. Sauteing	D. There should be no drop in temperature or interruptions while cooking continues.
E. Baking	E. Care should be taken not to burn the oil.

Figure 4.14. CMMDT Question 14

In this question, an attempt was made to determine the misconception regarding the Deep Frying method. The correct answer in the first stage of the question is option A, and in the second stage the correct answer is option A. The amount and rates of students' preference for the options of the question are given in table 4.28. In the first stage of the question, students chose option A, which is 89.66% correct. In the second stage, option A, which was correct with a rate of 82.76%, was preferred (Table 4.28.).

Table 4.28. Amount and rate of students choosing the options of the 14th question

	Preferred Option	**A**	**B**	**C**	**D**	**E**	**Blank**	**Total**
Stage I	**N**	52	0	1	0	5	0	58
	%	89,66	0,00	1,72	0,00	8,62	0,00	100
Stage II	**N**	48	5	1	4	0	0	58
	%	82,76	8,62	1,72	6,90	0,00	0,00	100

Students' misconceptions about the Deep Frying method are given in table 4.29. Five students thought that the proposition given in Stage I of the question was related to the Baking method (Table 4.29).

Table 4.29. Students' misconceptions about the Deep Frying method

Misconception	f	%
Baking	5	8,62
Cooking in Low Oil by Stirring (Stir Fyring)	1	1,72

4.15. Findings from Question 15

15. "It is the cooking of food in a heat source provided by wood or coal." Which of the following cooking methods could the expression refer to?	**Because**
A. Broiling	A. Heat is transmitted to food through irradiation.
B. Roasting	B. The top of the food is browned.
C. Stir Fyring	C. It is one of the most commonly used dry heat cooking methods.
D. Grilling	D. The cooking degree of food is adjusted by the distance from the heat source.
E. Baking	E. It is one of the healthiest cooking methods.

Figure 4.15. CMMDT Question 15

In this question, an attempt was made to determine the misconception regarding the Grilling method. The correct answer in the first stage of the question is option D, and in the second stage the correct answer is option A. The amount and rates of students' preference for the options of the question are given in table 4.30. In the first stage of the question, students chose option D, which is 60.34% correct. In the second stage, option A, which was correct with a rate of 22.41%, was preferred (Table 4.30.).

Table 4.30. Amount and rate of students choosing the options of the 15th question

	Preferred Option	A	B	C	D	E	Blank	Total
Stage I	**N**	20	0	0	35	3	0	58
	%	34,48	0,00	0,00	60,34	5,17	0,00	100
Stage II	**N**	13	4	23	15	2	1	58
	%	22,41	6,90	39,66	25,86	3,45	1,72	100

Students' misconceptions about the Grilling method are given in table 4.31. Twenty students thought that the proposition given in Stage I of the question was related to the Grilling-Broiling method (Table 4.31.).

Table 4.31. Students' misconceptions about the Grilling method

Misconception	f	%
Cooking on the Grill - From the Top (Broiling)	20	34,48
Baking	3	5,17

4.16. Findings from Question 16

16. " It is a method of cooking food by directly holding it to a heat source via air gas or electricity." Which of the following cooking methods could the expression refer to? A. Grilling B. Broiling C. Stir Fyring D. Roasting E. Baking	**Because** A. This method is used to brown food. B. It is one of the most commonly used dry heat cooking methods. C. This method is applied at low temperature. D. Foods must be oiled at regular intervals during cooking. E. Separate temperatures should be applied for each food group.

Figure 4.16. CMMDT 16.Soru

In this question, an attempt was made to determine the misconception regarding the Grilling-Broiling method. The correct answer in the first stage of the question is option B, and in the second stage the correct answer is option A. The amount and rates of students' preference for the options of the question are shown in Table 4.31. It is given in . In the first stage of the question, students chose option B, which was 18.97% correct. In the second stage, option A, which was correct with a rate of 27.59%, was chosen (Table 4.32).

Table 4.32. Amount and rate of students choosing the options of the 16th question

	Preferred Option	A	B	C	D	E	Blank	Total
Stage I	**N**	6	11	0	10	31	0	58
	%	10,34	18,97	0,00	17,24	53,45	0,00	100
Stage II	**N**	16	15	2	6	16	3	58
	%	27,59	25,86	3,45	10,34	27,59	5,17	100

Students' misconceptions about the Grilling-Broiling method are given in table 4.31. Thirty-one students thought that the proposition given in Stage I of the question was related to the Baking method (Table 4.33.).

Table 4.33. Students' misconceptions about the Grilling-Broiling method

Misconception	f	%
Cooking on the Grill - From the Bottom (Grilling)	6	10,34
Roasting in the Oven	10	17,24
Baking	31	53,45

4.17. Findings from Question 17

17. "The amount of oil used in cooking should not exceed the ingredients." Which of the following cooking methods could the expression refer to?	**Because**
A. Shallow Fat Frying	A. In this method, food is fried with a small amount of oil.
B. Deep Frying	B. This method can be used in a sauté pan or frying pan.
C. Stir Fyring	C. The temperature of the oil should neither be too low nor too high.
D. Roasting	D. Rapid mixing method is applied in the frying process.
E. Sauteing	E. It is the method in which heat-resistant oils are used.

Figure 4.17. CMMDT Question 17

In this question, an attempt was made to determine the misconception regarding the Shallow Fat Frying method. The correct answer in the first stage of the question is option A, and in the second stage the correct answer is option A. The amount and rates of students' preference for the options of the question are given in table 4.34. In the first stage of the question, students chose option A, which is 70.69% correct. In the second stage, option A, which was correct with a rate of 65.52%, was preferred (Table 4.34.).

Table 4.34. Amount and rate of students choosing the options of the 17th question

	Preferred Option	A	B	C	D	E	Blank	Total
Stage I	**N**	41	1	11	3	2	0	58
	%	70,69	1,72	18,97	5,17	3,45	0,00	100
Stage II	**N**	38	4	6	4	1	5	58
	%	65,52	6,90	10,34	6,90	1,72	8,62	100

Students' misconceptions about the Shallow Fat Frying method are given in table 4.35. Eleven students thought that the proposition given in Stage I of the question was related to the Stir Fyring method (Table 4.35).

Table 4.35. Students' misconceptions about Shallow Fat Frying method

Misconception	f	%
Stir Frying	11	18,97
Roasting in the Oven	3	5,17
Sauteing	2	3,45
Deep Frying	1	1,72

4.18. Findings from Question 18

18. "In this method, fast cooking is applied with little oil." Which of the following cooking methods could the expression refer to?	**Because**
A. Stir Fyring	A. The ingredients are mixed and cooked at constant temperature.
B. Shallow Fat Frying	B. The applied temperature is first low and then high.
C. Deep Frying	C. There is a high probability that the oil will burn.
D. Sauteing	D. It is among the healthy cooking methods.
E. Roasting	E. The aim is to cook the products at low temperatures.

Figure 4.18. CMMDT Question 18

In this question, an attempt was made to determine the misconception regarding the Sauteing method. The correct answer in the first stage of the question is option D, and in the

second stage the correct answer is option A. The amount and rates of students' preference for the options of the question are given in table 4.36. In the first stage of the question, students chose option D, which was correct with a rate of 13.79%. In the second stage, option A, which was correct with a rate of 56.90%, was chosen (Table 4.36).

Table 4.36. Amount and rate of students choosing the options of the 18th question

	Preferred Option	A	B	C	D	E	Blank	Total
Stage I	**N**	34	13	0	8	1	2	58
	%	58,62	22,41	0,00	13,79	1,72	3,45	100
Stage II	**N**	33	6	10	5	1	3	58
	%	56,90	10,34	17,24	8,62	1,72	5,17	100

Students' misconceptions about the Sauteing method are given in table 4.37. Thirty-four students thought that the proposition given in Stage I of the question was related to the Stir Fyring method (Table 4.37).

Table 4.37. Students' misconceptions about the Sauteing method

Misconception	f	%
Stir Frying	34	58,62
Shallow Fat Frying	13	22,41
Roasting in the Oven	1	1,72

4.19. Findings from Question 19

19. "This method is used for baking bread and pastry products." Which of the following cooking methods could the expression refer to?	**Because**
A. Roasting	A. The cooked product is covered.
B. Shallow Fat Frying	B. In this method, hot air circulation cooking is applied with hot air or steam.
C. Baking	C. Dry hot air frying is achieved by applying oil on the cooked products.
D. Broiling	D. Cooking can be done at high temperatures.
E. Roasting	E. The temperature is adjusted according to the product being cooked.

Figure 4.19. CMMDT Question 19

In this question, an attempt was made to determine the misconception regarding the Baking method. The correct answer in the first stage of the question is option C, and in the second stage the correct answer is option B. The amount and rates of students' preference for the options of the question are given in table 4.38. In the first stage of the question, students chose option C, which is 94.83% correct. In the second stage, option B, which was correct with a rate of 53.45%, was preferred (Table 4.38).

Table 4.38. Amount and rate of students choosing the options of the 19th question

	Preferred Option	A	B	C	D	E	Blank	Total
Stage I	**N**	1	0	55	1	1	0	58
	%	1,72	0,00	94,83	1,72	1,72	0,00	100
Stage II	**N**	1	31	4	2	19	1	58
	%	1,72	53,45	6,90	3,45	32,76	1,72	100

Students' misconceptions about the Baking method are given in table 4.39. Three students thought that the proposition given in Stage I of the question was related to the Roasting, Broiling and Roasting methods (Table 4.39).

Table 4.39. Students' misconceptions about the Baking method

Misconception	f	%
Roasting in the Oven	1	1,72
Cooking on the Grill - From the Top (Broiling)	1	1,72
Roasting in the Oven	1	1,72

4. CONCLUSION

The misconceptions identified in this pilot study, which was conducted to find out the misconceptions that culinary program students have about cooking methods, are as follows:

There are 24 (41.4%) students who have misconceptions about the boiling method. Students have misconceptions about the boiling method, namely pre-blanching, simmering and poaching in non-boiling hot water. There are 50 (86.2%) students who have misconceptions about the blanching method. Students have misconceptions about the pre-blanching method, namely steaming, simmering, poaching and boiling. There are 41 (70.7%) students who have misconceptions about the poaching method in non-boiling hot water. Students have misconceptions about the poaching method, namely simmering, pre-blanching and steaming, respectively.

There are 47 (81%) students who have misconceptions about the simmering method. Students have misconceptions regarding the simmering method, respectively poaching in non-boiling hot water, pre-boiling (blanching) and steaming (steaming). There are 44 (75.9%) students who have misconceptions about the stewing method. Students experience misconceptions between the stewing method and the braising method in a little water over low heat. There are 57 (98.3%) students who have misconceptions about the braising method. Students have misconceptions about the braising method, namely sauteing, simmering and stewing, respectively. There are 29 (50%) students who have misconceptions about the steaming method. Students have misconceptions regarding the

steaming method, namely braising, stewing, simmering and sauteing.

There are 51 (87.9%) students who have misconceptions about the oven roasting method. Students have misconceptions regarding the oven roasting method, namely baking, roasting, stewing and sauteing. There are 15 (25.9%) students who have misconceptions about the Bain-marie method. Students have misconceptions about the bain-marie method, namely sauteing and braising in a little water over low heat, respectively. There are 38 (65.5%) students who have misconceptions about the microwave method. Students have misconceptions regarding the microwave (microwave) method, respectively, bain-marie, vacuum cooking (sous-vide) and braising in a little water over low heat.

There are 50 (86.2%) students who have misconceptions about the infrared cooking method. Students have misconceptions about the bain-marie and microwave methods, respectively, regarding the infrared cooking method. There are 34 (58.6%) students who have misconceptions about the vacuum cooking (sous vide) method. Students have misconceptions about the vacuum cooking (sous vide) method, respectively the bain-marie, infrared and microwave (microwave) methods. There are 51 (87.9%) students who have misconceptions about the stir frying method. Students have misconceptions about the stir frying method, respectively, sauteing, shallow fat frying and baking.

There are 10 (17.2%) students who have misconceptions about the deep frying method. Students have misconceptions about the deep frying method, respectively the baking and stir frying methods. There are 48 (82.8%) students who have misconceptions about the grilling method. Students have misconceptions about the grilling-from-bottom (grilling)

method, respectively, about the grilling-from-top (broiling) and oven-baking methods.There are 50 (86.2%) students who have misconceptions about the broiling method. Students have misconceptions about the grilling-from-the-top (broiling) method, respectively the grilling-from-the-bottom (grilling), roasting and baking methods. There are 26 (44.8%) students who have misconceptions about the shallow fat frying method. Students have misconceptions about the shallow fat frying method, namely stir fyring, roasting, sauteing and deep frying.

There are 54 (93.1%) students who have misconceptions about the sauteing method. Students have misconceptions about the sauteing method, such as stir fyring, shallow fat frying and oven roasting, respectively. There are 30 (51.7%) students who have misconceptions about the baking method. Students have misconceptions about the baking method, namely roasting, broiling and roasting.

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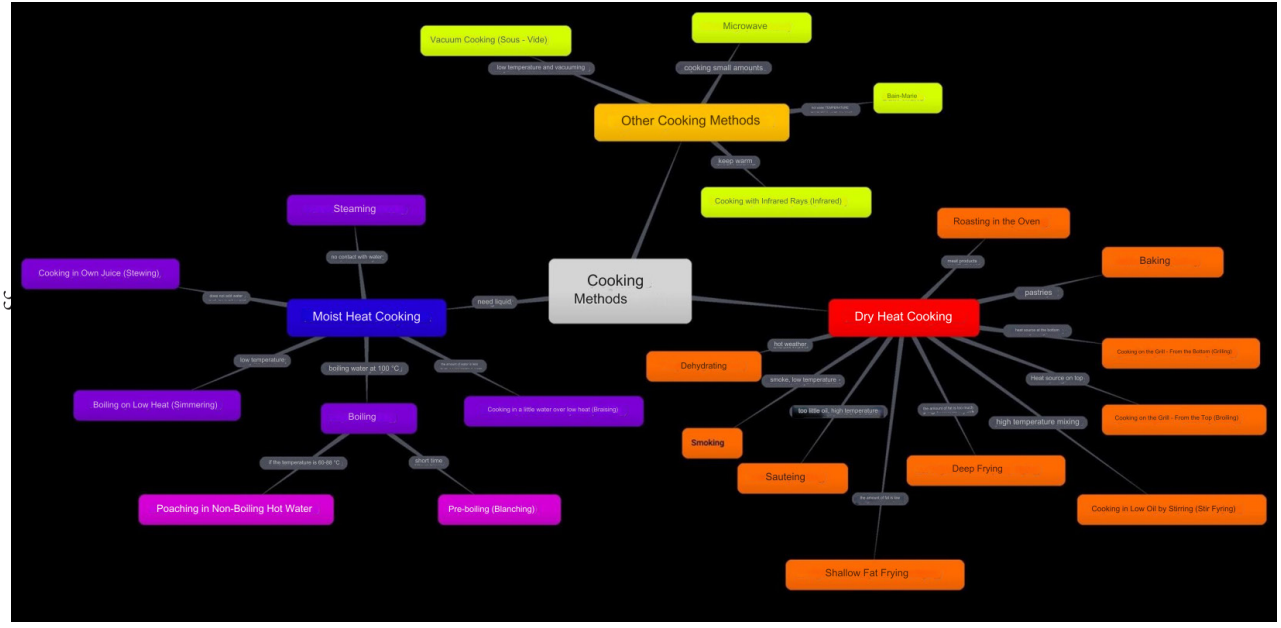
ANNEX 1.

Cooking Methods Concept Map



APPENDIX 2.
Cooking methods misconception detection test (CMMDT)

1. "The ingredients are added to boiling water at 100°C and the cooking process is carried out." Which of the following cooking methods could the expression refer to?
   A. Blanching
   B. Boiling
   C. Simmering
   D. Poaching
   E. Steaming

Because

A. In the scalding method, cooking can be done by starting with both boiling water and cold water.
B. In cooking in an aqueous environment, the degree to which the water or cooking liquid is heated determines the method applied.
C. When boiling vegetables, the amount of water should be enough to cover the vegetables.
D. Vegetables, starchy foods and meats are suitable for cooking with this method.
E. The method of boiling at 85-96°C is called low temperature simmering.

2. "One of the purposes of this method is to preserve the color of the vegetables." Which of the following cooking methods could the expression refer to?
   A. Simmering
   B. Blanching
   C. Steaming
   D. Boiling
   E. Poaching

Because

A. Various sauces and soups prepared using meat broths are cooked by the simmering method.
B. This method is generally used for vegetables such as legumes, potatoes and carrots that require a long time to cook.
C. The lid of the pot is closed and the lid is kept closed during cooking.
D. In this method, materials are added to water at around 100 °C and kept for a short time.
E. In this method, foods that may be damaged by boiling are cooked.

3. "It is a cooking method applied in a liquid at 60 - 88 °C, paying attention to temperature control." Which of the following cooking methods could the expression refer to?
   A. Steaming
   B. Simmering
   C. Poaching
   D. Boiling
   E. Blanching

Because

A. This method helps preserve the nutritious parts and colors of many vegetables.
B. This method is a method of cooking in boiling, non-boiling water.
C. In this method, boiled food is ensured to absorb water.
D. In this method, hardness and firmness are achieved on the outer surface of the food.
E. This method is generally used for vegetables such as legumes, potatoes and carrots that require a long time to cook.

4. "For delicate meats and vegetables, low temperatures are used to prevent damage and wear caused by boiling at high temperatures." Which of the following cooking methods could the expression refer to?
   A. Poaching
   B. Blanching
   C. Steaming
   D. Simmering
   E. Boiling

Because

A. In this method, cooking should be started with little water.
B. For this method, it should be determined well which cooking water will be used for vegetables.
C. Boiling is done at 88-96°C.
D. This method is generally used for ingredients that take a short time to cook.
E. Vegetables cooked in this method can be used in making sauces and soups.

5. "The ingredients are cooked over low heat by allowing them to release their own water or by adding a little water." Which of the following cooking methods could the expression refer to?
   A. Poaching
   B. Braising
   C. Stewing
   D. Simmering
   E. Roasting

Because

A. Foods placed in the perforated gastronome are cooked with this method.
B. The important element in this technique is cooking water.
C. This method is generally used for delicate materials.
D. In this method, the products cooked are first roasted and then water is added.
E. In this method, cooking should be started with little water.

6. "It is a method generally applied to thicken sauces and increase flavor." Which of the following cooking methods could the expression refer to?
   A. Simmering
   B. Braising
   C. Steaming
   D. Stewing
   E. Sauteing

Because

A. In this method, cooking is faster with the high and moist heat of the steam.
B. Meat, fish and chicken broths are used as cooking water.
C. This technique uses high temperature.
D. In this method, the material is dehydrated and used with appropriate food.
E. In this method, cooking should be started with little water.

7. "In this method, the nutritional value and color of the food is preserved." Which of the following cooking methods could the expression refer to?
   A. Sauteing
   B. Simmering

C. Steaming
D. Braising
E. Stewing

Because

A. This method uses a small amount of oil.
B. The cooking process takes place at low temperature.
C. In this method, the ingredients are cooked by steaming them directly.
D. The dry hot air used in this method preserves the structure of the food.
E. The use of alkaline water is common in this method.

8. "Cooking is done with hot air without adding water. Meat products are widely used in this method." Which of the following cooking methods could the expression refer to?
   A. Stewing
   B. Sauteing
   C. Baking
   D. Roasting
   E. Braising

Because

A. In this method, cooking time should be kept short.
B. It is sufficient to apply its own juice or oil to the material during the cooking process.
C. Ingredients can be flavored before cooking.
D. The internal temperature of the cooked material is important.
E. In this method, pre-cooking process is applied.

9. "It is a method of cooking delicate foods by placing another container over a container containing hot water." Which of the following cooking methods could the expression refer to?
   A. Microwave
   B. Bain-Marie
   C. Baking
   D. Sauteing
   E. Braising

Because

A. It minimizes health risks by pasteurizing food.
B. It is one of the fast cooking methods.
C. There is a risk of products burning at high temperatures.
D. Food cooks or coagulates with the heat from the water.
E. This method is used for pastries.

10. "In this method, there is no boiling, frying or roasting." Which of the following cooking methods could the expression refer to?
   A. Stir Fyring
   B. Braising
   C. Sous – Vide
   D. Microwave
   E. Bain-Marie

Because

A. Food should not be in large pieces.
B. It is used to thaw or heat frozen products.
C. Heat transfer occurs through conduction.
D. The water ratio of the products is important in the application of the method.
E. This method can only be used on vegetables.

11. "It is mostly used in holding units to keep food warm." Which of the following cooking methods could the expression refer to?
    A. Bain-Marie
    B. Infrared
    C. Sous – Vide
    D. Stir Fyring
    E. Microwave

Because

    A. It is only suitable for cooking small quantities.
    B. It can be used in cooking potatoes and vegetables.
    C. In this method, foods are cooked by sending infrared rays on them.
    D. This method is not capable of industrial or large-scale production.
    E. This method is used to melt chocolate and make sauce.

12. "It is the cooking of food in tanks with water circulation without contact with liquid." Which of the following cooking methods could the expression refer to?
    A. Sous – Vide
    B. Bain-Marie
    C. Infrared
    D. Deep Frying
    E. Microwave

Because

A. The cooking process takes place between 57-85 °C for varying periods of time depending on the quality and quantity of the material.
B. Food items are placed in heat-resistant plastic bags in portions and cooked after removing air.

C. In this method, ovens that provide both heat and steam circulation can be used.
D. It is a method in which mostly large pieces of food are cooked.
E. The amount of oil in the cooking process should be very low.

13. "It is a cooking method applied in a pan with no oil or very little oil, first at high and then at low heat, with its own juices, without closing the lid." Which of the following cooking methods could the expression refer to?
    A. Shallow Fat Frying
    B. Sauteing
    C. Stir Fyring
    D. Deep Frying
    E. Baking

Because

A. Once the oil is hot, the food should be added to the pan.
B. In this method, constant high temperature is not applied.
C. It is a method of cooking small and equal portions of food.
D. Any type of oil can be used in cooking.
E. The temperature should be between 160–240 °C.

14. "In this method, the food fried in oil has very little contact with air." Which of the following cooking methods could the expression refer to?
    A. Deep Frying
    B. Shallow Fat Frying
    C. Stir Fyring
    D. Sauteing
    E. Baking

Because

A. Frying is done in deep containers with plenty of oil.
B. Before cooking in oil, the frying pan and oil are preheated.
C. Too little oil will cause it to burn quickly.
D. There should be no drop in temperature or interruptions while cooking continues.
E. Care should be taken not to burn the oil.

15. "It is the cooking of food in a heat source provided by wood or coal." Which of the following cooking methods could the expression refer to?
    A. Broiling
    B. Roasting
    C. Stir Fyring
    D. Grilling
    E. Baking

Because

A. Heat is transferred to food by irradiation.
B. The top of the food is browned.
C. It is one of the most commonly used dry heat cooking methods.
D. The degree of cooking of food is adjusted by the distance from the heat source.
E. It is one of the healthiest cooking methods.

16. "It is a method of cooking food by directly holding it to a heat source via air gas or electricity." Which of the following cooking methods could the expression refer to?
    A. Grilling
    B. Broiling

C. Stir Fyring
D. Roasting
E. Baking

Because

A. This method is used to brown food.
B. It is one of the most commonly used dry heat cooking methods.
C. This method is applied at low temperature.
D. Foods must be oiled at regular intervals during cooking.
E. Separate temperatures should be applied for each food group.

17. "The amount of oil used in cooking should not exceed the ingredients." Which of the following cooking methods could the expression refer to?
    A. Shallow Fat Frying
    B. Deep Frying
    C. Stir Fyring
    D. Roasting
    E. Sauteing

Because

A. In this method, food is fried with a small amount of oil.
B. This method can be used in a sauté pan or frying pan.
C. The temperature of the oil should neither be too low nor too high.
D. Rapid mixing method is applied in the frying process.
E. It is the method in which heat-resistant oils are used.

18. "In this method, fast cooking is applied with little oil." Which of the following cooking methods could the expression refer to?
    A. Stir Fyring
    B. Shallow Fat Frying
    C. Deep Frying
    D. Sauteing
    E. Roasting

Because

A. The ingredients are mixed and cooked at constant temperature.
B. The applied temperature is first low and then high.
C. There is a high probability that the oil will burn.
D. It is among the healthy cooking methods.
E. The aim is to cook the products at low temperatures.

19. "This method is used for baking bread and pastry products." Which of the following cooking methods could the expression refer to?
    A. Roasting
    B. Shallow Fat Frying
    C. Baking
    D. Broiling
    E. Roasting

Because

A. The cooked product is covered.
B. In this method, hot air circulation cooking is applied with hot air or steam.

C. Dry hot air frying is achieved by applying oil on the cooked products.
D. Cooking can be done at high temperatures.
E. The temperature is adjusted according to the product being cooked.

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