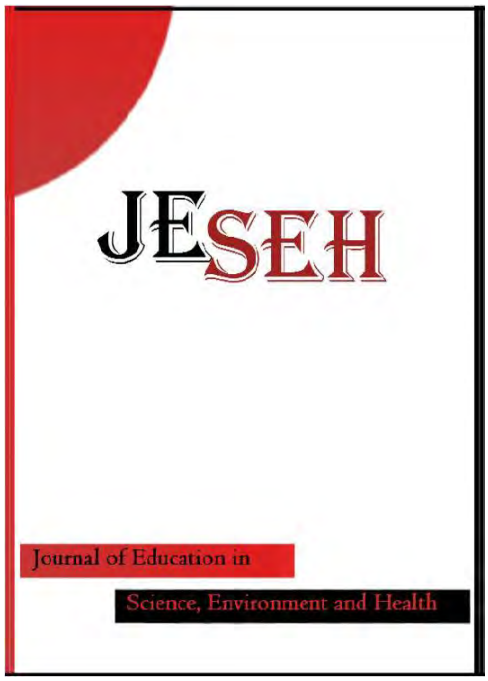

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The Effect of a Card Game upon Achievements within Medical Terms Topic: MedTerm Game

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Abstract

The study was attempted to determine the efficiency of the card game named 'MedTerm' upon the students' achievements of the medical terms. The research was one group pre-test and post-test without control group research design and the study group elected by using the convenience sampling method consisted of the first-year students (n=46) elderly care program of the vocational school of health services of a university in northern Turkey. All students who voluntarily participated in the study played the card game named 'MedTerm' in order to learn medical terms. In the research, 'The Medical Terms Achievement Test (MTAT)' consisted of 57 open-ended questions was used as data collection tool. Achievement scores related to medical terms before and after the game were evaluated. At the end of the implementation, the semi-structured interviews were also conducted with randomly selected students.. As a result of the research, a statistically significant difference was found between the pre-test mean scores and the post-test mean scores in favour of the post-test ($t=-17.141$, $p<0.05$). In accordance with the data obtained, it can be said that the 'MedTerm' card game increases elderly care program students' sound and partial understandings of medical terms and their achievements. In addition, it was concluded that all students expressed positive views concerning the functioning of the course.

Introduction

The terms generated and used in medicine and health care are called medical terms and the use of these terms across the world creates a universal language assuring world health (Tekin &Atas, 2018). Medical terms are crucial for accurate, quick, efficient, and quality communication in medicine (Cankur, 2002; Tekin &Atas, 2018). The efficiency of learning and practice in health education depends on the success of learning medical terminology but is equally significant in professional and academic life (Abdulmajed et al. 2015; Akl et al. 2010; Alfarah et al. 2010; Babacan et al. 2016; Meterissian et al. 2007). In this context, medical terminology is taught in health education, as every health worker must use medical terms effectively.

With the aging of the world population, the importance of professions has increased provide professional care services to the elderly (Birinci, 2020). Students who are one of the candidates for this profession in elderly care associate degree program at the department of Health care services prepares and provides medical and psychological environments to provide the care that elderly individuals need. They are individuals who can produce solutions in the implementation of care services, have analytical thinking skills, are prone to teamwork, have a sense of responsibility. These students are health technicians and they are a crucial part of the health team in the production of health care. In this context, they need to implement medical terms effectively and correctly in their professional life. However, students may have difficulty understanding medical terms they have met for the first time in their education life. Since the terms are taught as a dictionary, they frequently think it boring and monotonous (Babacan et al. 2016; Lickiewicz et al. 2020).

In this context, unlike conventional teaching, the use of games in the teaching of medical terms is effective in motivating students to be curious, motivated, organizing their knowledge in the learning process, and helps in terms of their learning responsibilities (Lickiewicz et al. 2020). Game-based learning (GBL) is both fun and educational approach to achieving the determined learning outcomes (Jabbar & Felicia, 2015; Shaffer et al. 2005). The use of GBL in the education process increases learning activities (Partovi & Reza Razavi, 2019; Trajkovik et al. 2018). Games that are played manually and require movement provide the relation of existing information with daily life, the formation of connections between neurons in the brain, and permanent learning (Yazıcıoglu & Cavus-Gungoren, 2019). For this reason, card and board games played in the GBL process include the expression, physical movements, and verbal intonations of individuals who exist in face-to-face

interaction, unlike games performed in digital media. In these games, communication between student-educator and student-student, which cannot be directly provided in audio-visual digital games, can be comfortably provided (Billinghurst & Kato, 2002; Feng Liu & Chen, 2013).

In the relevant literature, there are many studies on various topics in different disciplines that board and card games increase academic achievement (Chen et al. 2020; Rastegarpour &Marashi, 2012; Sadler et al. 2013). Especially in the literature, there are studies using board and card games in the healthcare field at the undergraduate level (Anyanwu, 2014; Giddens, 2010; Ridley, 2004; Lennon & Coombs, 2007). For example, Hill & Nassrallah (2018) developed and implemented a card game in an anatomy course in order to teach the liver and portal venous system in their study. The research showed that the students enjoyed playing the card game and had a higher achievement scores concerning the relevant topic. Burleson and Olimpo (2016) used a word string game named 'ClueConnect' to examine its impact on students' understanding of the terminology in the introduction to anatomy and physiology in the healthcare field course at the undergraduate level. In the game, students tried to define the terms by generating descriptive sequences and positioning them structurally and functionally in the body. As a result, the study revealed the game increases the students' understanding and expresses positive opinions that they have fun. In his study, Boctor (2013) developed a game named 'Nursopardy' in the nursing principles course, and with that game, he attempted to repeat the students' knowledge. It was concluded that the game in the study was effective in repeating the students' knowledge and increased their learning. Gomez-Urquiza et al. (2010) examined the effect of the "Escape Room" game on nursing students' learning. In the game, students were expected to accurately demonstrate both their theoretical and practical knowledge by solving puzzles and escaping the room they were in within 30 minutes. The study showed that the game increases students' learning and that they have opinions that the learning process is fun and motivating.

There have been no studies in the literature using the card and board games in the healthcare field at the associate degree and investigating the impact of these games on their academic achievements. In this context, this research attempted to develop and apply a card game in terms of game-based learning of medical terms for the students of the health care associate degree and to examine the effect of the game on their academic achievement. It is believed that the study could shed light on future research at the associate degree programs in the healthcare field and close the gap in the literature. The problem statement of the research is, *"What is the impact of the 'MedTerm' card game on the academic achievements of the first-year students studying in the Elderly Care Associate Degree Program of the Department of Health Care Services of the Vocational School of Health Services in the course 'Elderly Care Principles and Practices 1' at a university in northern Turkey?*", and its sub-problems are as follows:

- Is there a significant difference between the pre-test and post-test achievement scores of the first year students of the Elderly Care Associate Degree Program?

- What are the opinions of the first year students of the Elderly Care Associate Degree Program about the game?

Method

The Study Group

The research was carried out as one group with a pre-test post-test without control group research pattern (Robson, 2015).The population of the study was composed of first-year students (N=72) studying in the Elderly Care Associate Degree Program of the Department of Health Care Services of the Vocational School of health services of a university located in northern Turkey in the fall semester of 2018-2019 academic year. Convenience sampling method is used in this research. In the cases where not to reach the whole of the sample, researchers can work with appropriate sample groups to represent the study. The study group included students who volunteered to participate in the research from this class and students who did not come out of the health vocational high school (n=46). The researcher gave theoretical information about medical terms to all students in the theoretical part of the 'Elderly Care Principles and Practices I' course. The practice course was taught with the "MedTerm" word game. All students were informed about the implementation process and how to perform it, and the written informed consent forms were obtained from the students (Christensen et al., 2015; Taber, 2014). In addition, each student was given a code in order to keep the identity information of the students confidential (for instance *S-8, S-11, S-46*).The ethics committee's permission for the research was obtained from the local ethics committee with the number protocol no: 679. After the implementation of the post-test and

interviews, the 'MedTerm' game was also applied to the health vocational high school students. In addition, students who did not want to participate in this research previously voluntarily wanted to play the 'MedTerm' game when they saw that their friends had fun after the after the application. In this context, the game was also played to these students after the implementation process.

Data Collection Tools

Medical Terms Achievement Test 'MTAT'

The Medical Terms Achievement Test (MTAT) was developed by taking the opinions of two experts and examining the related literature (Abduvossiyevna, 2020; Ekinci &Hatipoglu 2018; Koprulu, 2017) (See Appendix 1). Medical terms commonly used in the 'Elderly Care Principles and Practices I' course and the terms asked to students in mid-term and final exams in previous years are listed. The 57 medical terms created were both asked as open-ended questions in the MTAT and used in the game 'MedTerm'. The first 27 questions asked in the open-ended questions in the test are related to respiratory system, questions between 28-40 are related to cardiovascular system, questions between 41-52 include body temperature, questions 53 and 54 include blood pressure, and questions between 55-57 include general medical terms.

The test was carried out as a pilot test with the students who were taught the medical terms in previous years (n=100). In order to determine the reliability and validity of the test, the reliability coefficient of the test (Kuder-Richardson 20), the mean discrimination index of the items (r) and the mean difficulty index (p) were analyzed by content analysis according to the responses given by the students to the open-ended questions. Content analysis was carried out in accordance with the concept-evaluation scheme developed in previous studies in the literature (Abraham et al. 1994; Marek, 1986; Nakiboglu, 2003). Originally, this cheme consists of four categories, and some researchers have used different concept-evaluation schemes consisting of three or five categories. The categories, their explanations and scores shown in Table 1 were used in this study:

Table 1. Categories, explanations, scores and some examples

Categories	Explanations	Scores	Some Examples
Sound Understanding (SU)	Responses are scientifically accepted correct and complete answers	3	'Bradycardia is a slow resting heart rate, commonly under 60 beats per minute.'
Partial Understanding (PU)	Responses include the answers that contain a part of the scientifically accepted answer	2	'Bradycardia means heartbeat.'
Misunderstanding (MU)	Responses are scientifically incorrect answers	1	'Bradycardia causes rapid heartbeat.'
Unanswered (UA)	Responses include empty, meaningless, irrelevant, or ambiguous answers	0	'I have no idea.' '.....' (Blank answers)

In the pilot test, the responses given by the students containing SU and/or PU were accepted as the right answers and containing MU and/or UA were accepted as wrong answers. Therefore, right answers were scored as '1' and wrong answers were scored as '0' in the pilot test. The mean item difficulty index and the mean item discrimination index of the test were calculated as 0.41 and 0.53, respectively. The reliability coefficient of the test was found to be 0.960 by using the SPSS package program. In this context, it was concluded that the test has high reliability, medium difficulty and high discrimination power. The reliability and validity of the MTAT are sufficient and it was applied without removing any of the items. The MTAT was carried out before and after the implementation as a pre-and post-test.

Semi-Structured Interviews

The semi-structured interviews in the study were consisting of 1 open-ended question developed by taking the opinions of two experts and were conducted with 19 randomly selected students in 10 minutes periods. The students were asked the question at the end of the implementation process to get their opinions about the functioning of the course. The question was that *'What do you think about the functioning of the course? Please express your positive and/or negative views about the functioning of this course.'* The researcher used a tape recorder during interviews and recorded the obtained data in writing.

Data Analysis

The researchers analyzed the responses of open-ended questions of MTAT test in accordance with the categories and scores in Table 1.The highest score in the MTAT test is 171 and the lowest score is 0. The responses of the each questions were categorized and scored by two separate experts. Average agreement percentage was calculated by the formula $P = N_a.100 / N_a + N_d$ (N_a = Number of agreements, N_d = Number of disagreements, P = Agreement percentage) (Cavanagh, 1997) and was found to be 90%. The data obtained were used in statistical calculations to determine whether there was a significant difference between students' pre- and post-test scores. The statistical analysis of the study was made using the SPSS 19.0 package program. To determine which statistics to be used in the research, it was examined whether the achievement scores displayed a normal distribution or not. Skewness and Kurtosis values, Kolmogrov-Smirnov Test and Shapiro-Wilk Test of these scores were examined (Table 2):

Table 2. The normality distribution results of the MTAT pre-test and post-test

	Kurtosis		Skewness			
Variables	Coefficient Score	Standard Error	Coefficient Score	Standard Error	K-S Test	S-W
Pre-test	1.042	.688	.846	.350	.200	.026
Post-test	-.012	.688	.081	.350	.200	.987

When the skewness and kurtosis coefficients and the normal distribution graphs were examined, the results showed that the values were close to normal (Tabachnick & Fidell, 2007). Since the data show the normal distribution, a paired-samples t-test, one of the parametric tests, was used to determine whether there was a significant difference between the MTAT pre- and post-test scores. In addition, the data from semi-structured interviews were also categorized and scored by two separate experts and the average agreement percentage was calculated as 95%.

Development and Implementation of the Game: 'MedTerm'

The 'MedTerm' card game was inspired by the Taboo (Hasbro Inc., Pawtucket, RI) game and developed by reviewing the literature (Sallo 2020; Olimpo et al. 2010). In the classic Taboo game, one of the players is given a series of cards with a keyword and several taboo words. The goal of the game is for the player to explain as many keywords as possible to their team mates within the given time without using the taboo words. The team that knows the most words correctly wins the game. In this study, 57 medical terms used in MTAT test were also used in MedTerm based on the classic taboo game. There is a MedTerm game board, dice, and colored cards at the game. There are 30 cards in the game that contain forbidden words and keywords. It is aimed to explain the keyword on these cards without using the forbidden words. The keywords in the other 13 cards include words that need to be explained using 10 words. The words on the other 14 cards are the words that should be explained by drawing (see Table 3). Four forbidden words have been created for each keyword on cards with banned words (see Figure 1). Cards with forbidden words, cards containing the words to be explained by drawing, and cards containing the words to be explained by using 10 words were prepared in three different colors. These colors are the same color as the boxes on the MedTerm game board. The game progresses by randomly selecting cards of the same color according to which color the box on the MedTerm game board is moving. MedTerm is played with a total of 8 people consisting of two separate teams of 4 people. A total of 6 groups were randomly formed for the MedTerm game in the classroom for this study. 5 groups consist of two separate teams of 4 people, a total of 8 people, and 1 group consists of two separate teams of 3 people. Each group tells their teammates the word they chose randomly within one minute:

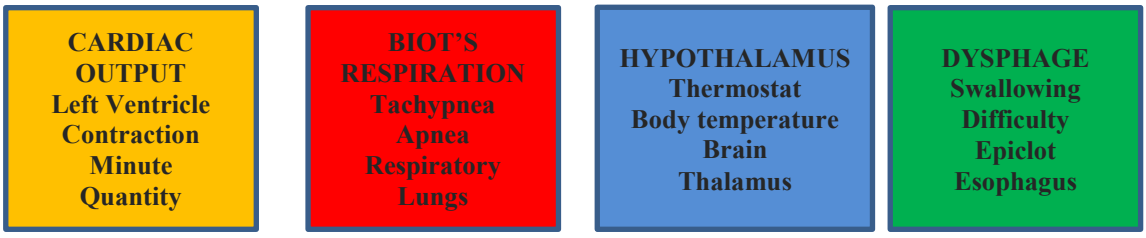

Figure 1.Keyword cards containing forbidden words

Table 3.List of forbidden words, words to be drawn and words to be described in 10 words

List of Keywords Containing Forbidden Words			
Keywords	Forbidden Words	Keywords	Forbidden Words
Cardiac output	Left ventricle, contraction, minute, quantity	Piloerection	Hair, body temperature, hypothermia, movement
Alveoli	Carbon dioxide, single-layer epithelium, diffusion, extreme ventricle	Constant fever	Continuous, high body temperature, fluctuation
Medulla oblongata	Center, respiratory, spinal cord, regulator	Vasodilatation	Vasoconstriction, dilatation, constriction, pregnancy
Hypothalamus	Thermostat, body temperature, brain, thalamus	Hyperventilation	Depth, speed, lung, movement
Diastolic blood pressure	Contraction, vascular, systolic, diastolic	Ventilation	Dilatation, constriction, oxygen, carbon dioxide
Tachycardia	Bradycardia, pulse, minutes, heartbeat	Biot's respiration	Tachypnea, apnea, respiratory, lungs
Apnea	Permanent, temporary, pause, respiration	Vasoconstriction	Vasodilation, vascular, constriction, hypertension
Stroke volume	Left ventricle, contraction,, blood, heart	Intermittent fever	Body temperature, morning, evening, irregular
Dysphagia	Swallowing, difficulty, epiclot, esophagus	Remittent fever	Fluctuating, high fever, 24 hours, change
Vital signs	Respiration, body temperature, systolic blood pressure, diastolic blood pressure	Hypoxia	Oxygen, cell depletion, respiration
Systolic blood pressure	Aorta, vascular resistance, first beat, systolic	Cheyne- Stokes respiration	Heart disease, brain hemorrhage, respiratory rate, apnea
Tachypnea	Sport, ladder, fast, minute	Bradypnea	Sleep, sedation, minute, slow
Hypertrophy	Muscle, overuse, atrophy, growth	Kussmaul respiration	Metabolic acidosis, abnormal, deep, breathing
Atrophy	Muscle, disuse, hypertrophy, shrinkage	Anoxia	Oxygen, tissue, deprivation, lung
Bradycardia	Tachycardia, pulse, minute, heartbeat	Recurrent fever	Recurrent, high, body temperature, 24 hours
List of Words to be Drawn		List of Words to be Expressed in 10 Words	
Cyanosis	Oral cavity	Rhythmic pulse	Trachea
Arteria brachialis	Axillary path	Uvula	Hypothermia
Arteria temporalis	Visceral pleura	Intercostal muscle	Hyperpnoea
Tympanic	Nasal cavity	Expiration	Dyspnea
Arteriafemoralis	Arteriaradialis	Inspiration	Eupnoea
Arteriacarotis	Pulse	Hyperthermia	Thready pulse
Parietal pleura	Arteriapoplitealis	Hypopnea	

We can sample the game on the MedTerm board shown in Figure 2 with the following items:

- One of the 4 student teams rolls the dice. The team that rolls the highest starts the game first. The people on the team who started the game first determine the order in which they tell among themselves. The person who starts first randomly selects cards of the same color as the box on the game board. The first three boxes shown in Figure 2 are yellow and yellow boxes indicate yellow-forbidden word cards. The team player who starts the game first randomly selects one of the forbidden word cards that are yellow. They try to explain their chosen keyword to their teammates within one minute without using the forbidden words written on the cards. If his teammates know that word correctly, the same team moves through a box. Each known word goes one more box than the boxes on the game board, and the word card they know is placed in the 'memory card' field on the game board.

- The fourth box on the game board represents the word card to be explained by the drawing. When the team arrives in this box, the purple cards are randomly selected and the players try to draw the word to their teammates within one minute without speaking or making hand gestures. If the teammates know this word correctly, the correct known card is placed in the memory card area and continued.
- Green boxes on the game board represent words to be described using 10 words. When the team comes to the boxes in the green area, the player randomly selects the cards in green. The players try explaining the word to their teammates in one minute using 10 words. If the teammates know this word correctly, the correct known card is placed in the memory card area and continued.
- Red-colored boxes on the game board are marked as 'M'. These boxes show that previously known cards placed in the memory card area will be drawn randomly. The player randomly selects the types of words in the memory card area (cards to be explained by drawing, word cards to be explained using 10 words, cards containing forbidden words) and explains them to their teammates.
- Misrepresented, unanswered, or expired word cards are unplaced in the memory card area. It is placed next to other cards to be selected randomly again.
- In case of misunderstanding and exceeding the time, the game line moves to the other team of 4. They also start the game by determining the explaining order among themselves.
- During the entire game, teams have the right to choose another card by passing only four times.
- In this way, the game continues until the team reaches the end point.

The implementation process of the game lasted a total of 120 minutes. At the end of the game, chocolate was given as a reward to the winning teams:

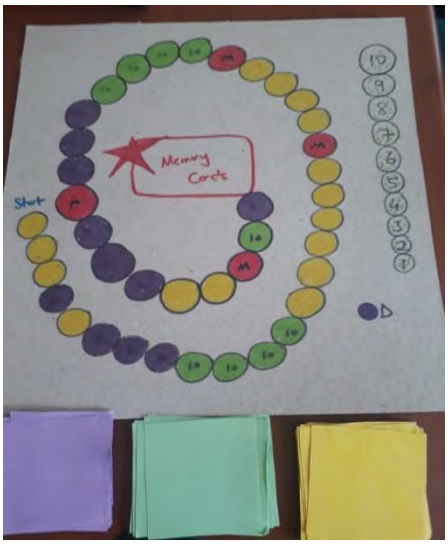

Figure 2. MedTerm game board and color cards

Results and Discussion

Results Concerning the Content Analysis of MTAT Pre- and Post-test

When the MTAT pre-test content analysis result was examined, the response frequencies of the majority of the students in the UA category (f: 2152, 82.1%) were higher than those in other categories (f: 352, 13.4% for SU; f: 79, 3% for PU; f: 40, 1.5% for MU) (see Table 4). This finding shows that most of the students did not know medical terms. In the results of post-test content analysis, although it was seen that most of the students had high response frequencies in the UA category (f: 1226, 46.4%), the response frequencies of the students in the SU (f: 948, 35.9%) and PU (f: 306, 11.6%) categories were higher than those in other categories (f: 162, 6.1% for MU). In addition, it was observed that the response frequencies of the students in the MU category increased in the post-test. This finding indicated that students have had misunderstandings. In general, it was concluded that the students' sound and partial understandings increased in the post-test, and their frequency in the UA category decreased. According to the data obtained, it can be said that the MedTerm card game has increased students' sound and partial understandings:

Table 4. The Results of Content Analysis of MTAT Pre- and Post-test

Q*	Pre-test Categories								Post-test Categories							
	SU		PU		MU		UA		SU		PU		MU		UA	
	f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%
1	3	*6.5*	0	*0*	8	*17.4*	35	*76.1*	14	*30.4*	13	*28.3*	1	*2.2*	18	*39.1*
2	21	*45.7*	7	*15.2*	1	*2.2*	17	*37*	37	*80.4*	4	*8.7*	1	*2.2*	4	*8.7*
3	22	*47.8*	7	*15.2*	3	*6.5*	14	*30.4*	37	*80.4*	4	*8.7*	1	*2.2*	4	*8.7*
4	15	*32.6*	4	*8.7*	3	*6.5*	24	*52.2*	32	*69.6*	4	*8.7*	3	*6.5*	7	*15.2*
5	9	*19.6*	0	*0*	1	*2.2*	36	*78.3*	16	*34.8*	3	*6.5*	2	*4.3*	25	*54.3*
6	0	*0*	2	*4.3*	0	*0*	44	*95.7*	6	*13*	9	*19.6*	1	*2.2*	30	*65.2*
7	0	*0*	2	*4.3*	0	*0*	44	*95.7*	4	*8.7*	9	*19.6*	1	*2.2*	32	*69.6*
8	8	*17.4*	1	*2.2*	0	*0*	37	*80.4*	12	*26.1*	6	*13*	3	*6.5*	25	*54.3*
9	1	*2.2*	0	*0*	0	*0*	45	*97.8*	3	*6.5*	5	*10.9*	0	*0*	38	*82.6*
10	20	*43.5*	1	*2.2*	0	*0*	25	*54.3*	23	*50*	3	*6.5*	2	*4.3*	18	*39.1*
11	25	*54.3*	2	*4.3*	0	*0*	19	*41.3*	40	*87*	1	*2.2*	2	*4.3*	3	*6.5*
12	25	*54.3*	0	*0*	1	*2.2*	20	*43.5*	38	*82.6*	2	*4.3*	1	*2.2*	5	*10.9*
13	0	*0*	0	*0*	1	*2.2*	45	*97.8*	14	*30.4*	7	*15.2*	5	*10.9*	20	*43.5*
14	8	*17.4*	0	*0*	1	*2.2*	37	*80.4*	37	*80.4*	1	*2.2*	4	*8.7*	4	*8.7*
15	12	*26.1*	4	*8.7*	2	*4.3*	28	*60.9*	33	*71.7*	9	*19.6*	1	*2.2*	3	*6.5*
16	7	*15.2*	5	*10.9*	1	*2.2*	33	*71.7*	31	*67.4*	10	*21.7*	1	*2.2*	4	*8.7*
17	5	*10.9*	4	*8.7*	1	*2.2*	38	*78.3*	27	*58.7*	10	*21.7*	1	*2.2*	8	*17.4*
18	3	*6.5*	1	*2.2*	1	*2.2*	41	*89.1*	31	*67.4*	3	*6.5*	3	*6.5*	9	*19.6*
19	0	*0*	2	*4.3*	0	*0*	44	*95.7*	23	*50*	4	*8.7*	2	*4.3*	17	*37*
20	3	*6.5*	2	*4.3*	0	*0*	41	*89.1*	24	*52.2*	5	*10.9*	4	*8.7*	13	*28.3*
21	0	*0*	2	*4.3*	0	*0*	44	*95.7*	0	*0*	4	*8.7*	16	*34.8*	26	*56.5*
22	0	*0*	1	*2.2*	0	*0*	45	*97.8*	1	*2.2*	1	*2.2*	15	*32.6*	29	*63*
23	15	*32.6*	0	*0*	1	*2.2*	30	*65.2*	33	*71.7*	1	*2.2*	2	*4.3*	10	*21.7*
24	1	*2.2*	0	*0*	0	*0*	45	*97.8*	1	*2.2*	4	*8.7*	16	*34.8*	25	*54.3*
25	1	*2.2*	1	*2.2*	0	*0*	44	*95.7*	22	*47.8*	7	*15.2*	1	*2.2*	16	*34.8*
26	2	*4.3*	1	*2.2*	0	*0*	43	*93.5*	17	*37*	7	*15.2*	3	*6.5*	19	*41.3*
27	16	*34.8*	1	*2.2*	1	*2.2*	28	*60.9*	29	*63*	3	*6.5*	2	*4.3*	12	*26.1*
28	14	*30.4*	2	*4.3*	1	*2.2*	29	*63*	27	*58.7*	1	*2.2*	5	*10.9*	13	*28.3*
29	1	*2.2*	0	*0*	0	*0*	45	*97.8*	9	*19.6*	4	*8.7*	2	*4.3*	31	*67.4*
30	2	*4.3*	1	*2.2*	0	*0*	43	*93.5*	13	*28.3*	3	*6.5*	3	*6.5*	27	*58.7*
31	10	*21.7*	6	*13*	4	*8.7*	26	*56.5*	29	*63*	9	*19.6*	3	*6.5*	5	*10.9*
32	8	*17.4*	1	*2.2*	1	*2.2*	35	*76.1*	27	*58.7*	5	*10.9*	5	*10.9*	9	*19.6*
33	2	*4.3*	0	*0*	1	*2.2*	43	*93.5*	13	*28.3*	6	*13*	2	*4.3*	25	*54.3*
34	2	*4.3*	**1**	*2.2*	**0**	*0*	43	*93.5*	26	*56.5*	3	*6.5*	1	*2.2*	16	*34.8*
35	0	*0*	2	*4.3*	0	*0*	44	*95.7*	7	*15.2*	16	*34.8*	2	*4.3*	21	*45.7*
36	0	*0*	2	*4.2*	1	*2.2*	43	*93.5*	5	*10.9*	18	*39.1*	0	*0*	23	*50*
37	1	*2.2*	3	*6.5*	0	*0*	42	*91.3*	5	*10.9*	19	*41.3*	3	*6.5*	19	*41.3*
38	0	*0*	3	*6.5*	0	*0*	43	*93.5*	4	*8.7*	21	*45.7*	0	*0*	21	*45.7*
39	0	*0*	2	*4.3*	0	*0*	44	*95.7*	4	*8.7*	15	*32.6*	6	*13*	21	*45.7*
40	0	*0*	2	*4.3*	0	*0*	44	*95.7*	5	*10.9*	15	*32.6*	2	*4.3*	24	*52.2*
41	0	*0*	0	*0*	0	*0*	46	*100*	4	*8.7*	13	*28.3*	2	*4.3*	27	*58.7*
42	2	*4.3*	0	*0*	0	*0*	44	*95.7*	11	*23.9*	0	*0*	4	*8.7*	31	*67.4*
43	2	*4.3*	0	*0*	0	*0*	44	*95.7*	8	*17.4*	0	*0*	4	*8.7*	34	*73.9*
44	0	*0*	0	*0*	0	*0*	46	*100*	4	*8.7*	0	*0*	2	*4.3*	40	*87*
45	7	*15.2*	0	*0*	0	*0*	39	*84.9*	17	*37*	3	*6.5*	4	*8.7*	22	*47.8*
46	0	*0*	1	*2.2*	1	*2.2*	44	*95.7*	8	*17.4*	4	*8.7*	6	*13*	28	*60.9*
47	18	*39.1*	1	*2.2*	1	*2.2*	26	*56.5*	36	*78.3*	1	*2.2*	1	*2.2*	8	*17.4*
48	2	*4.3*	0	*0*	0	*0*	44	*95.7*	2	*4.3*	2	*4.3*	3	*6.5*	39	*84.8*
49	0	*0*	0	*0*	0	*0*	46	*100*	2	*4.3*	1	*2.2*	1	*2.2*	42	*91.3*
50	0	*0*	0	*0*	0	*0*	46	*100*	1	*2.2*	1	*2.2*	0	*0*	44	*95.7*
51	0	*0*	0	*0*	0	*0*	46	*100*	5	*10.9*	1	*2.2*	0	*0*	40	*87*
52	19	*41.3*	0	*0*	1	*2.2*	26	*56.5*	34	*73.9*	0	*0*	1	*2.2*	11	*23.9*
53	10	*21.7*	1	*2.2*	1	*2.2*	34	*73.9*	18	*39.1*	3	*6.5*	2	*4.3*	23	*50*
54	9	*19.6*	1	*2.2*	1	*2.2*	35	*76.1*	17	*37*	3	*6.5*	2	*4.3*	24	*52.2*
55	4	*8.7*	0	*0*	1	*2.2*	41	*89.1*	1	*2.2*	0	*0*	1	*2.2*	44	*95.7*
56	0	*0*	0	*0*	0	*0*	46	*100*	2	*4.3*	0	*0*	1	*2.2*	43	*93.5*
57	17	*37*	0	*0*	0	*0*	29	*63*	19	*41.3*	0	*0*	0	*0*	27	*58.7*
T*	352	*13.4*	79	*3.0*	40	*1.5*	2152	*82.1*	948	*35.9*	306	*11.6*	162	*6.1*	1226	*46.4*

*Q: Questions, T: Total

If we give an example of the classification of students' responses to a particular question by categories in MTAT pre- and post-test content analysis, we can consider the 14th question. In the pre-test content analysis of the 14th question, in which the Turkish meaning of the medical term ' Eupnoea ' was asked, most of the students did not answer the question (f: 37, 80.4%). In the post-test content analysis, it is seen that the majority of students answered this question (f:37, 80.4%) in the category of SU. In addition, in the post-test, it was determined that one student answered in the PU category, four students in the MU category, and four students left the question blank (see Figure 3).

The students' sound, partial and misunderstanding answers to the medical term 'Eupnoea' for question 14 in the final test are as follows:

"It is Normal Respiration." ***(SU) (S-8, S-11, S-46)***
"It is Standard Respiration." ***(PU) (S-37)***
"It is Dyspnea." ***(MU) (S-14)***
"It's a Respiratory Retardation." ***(MU) (S-18)***
"It's the Respiratory Acceleration." ***(MU) (S-25)***
"It's a Respiratory Standstill." ***(MU) (S-44)***

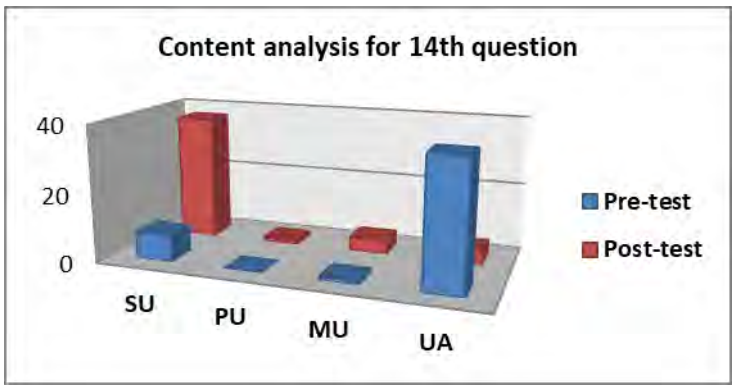

Figure 3.MTAT pre- and post-test content analysis for the 14th question

Results Concerning the Statistical Analysis of MTAT Pre- and Post-test

The results of the paired-samples t-test analysis regarding the MTAT pre and post-test scores of the students are shown in Table 5:

Table 5.Paired-Samples t-Test results for MTAT pretest-posttest scores

	N	$\overline{X}$	*SD*	*t*	*p*
Pre-test	46	28.978	13.851	-17.141	0.001
Post-test	46	78.652	22.648		

$p<0.05$

When Table 5 is examined, it is seen that there is a significant difference in favor of the post-test ($t = -17.141$; $p <0.05$) between the MTAT pre-test mean scores ($\overline{X} = 28.978$) and the post-test mean scores ($\overline{X} = 78.652$). This finding revealed that there was a statistically significant difference between the students' pre-and post-test scores in favor of the post-test. In addition, eta square value (η^2) and Cohen d value calculated for the size of statistical significance were found to be high (η^2=0 .747, d=2.65). Accordingly, it can be said that the MedTerm game is efficient in increasing students' achievements on medical terms.

Results Concerning the Semi-Structured Interviews

The content analysis result of the semi-structured interview performed at the end of the application is shown in Table 6. As seen in Table 6, all students expressed positive views about the functioning of the course (f: 48, 100.0%). None of the students expressed a negative view concerning the course. Their positive views include that the course is understandable/instructive, useful, catchy, visually enriched, fun, improving communication skills, and facilitating pronunciation:

Table 6. Content Analysis of the Semi-Structured Interviews and Some Student Statements

Positive Views			Negative Views		
Main Theme: Functioning of the course	f	%	Main Theme: Functioning of the course	f	%
Sub-themes:	48	100.0	Sub-themes:	0	0.00
Understandable / instructive	15	31.25	None	0	0.00
Catchy / intensifier	10	20.83	Some student statements		
Useful / fertile	10	20.83	‘It was intensifier. So we learned the medical terms better. Our communication with friends has increased. "**(S-1)**		
Fun	6	12.50			
Visually enriched	3	6.25			
Improving communication skills	3	6.25	‘‘It was a lesson that progressed without getting bored. The MedTerm game made us understand the lesson better. "**(S-3)**		
Facilitating pronunciation	1	2.09	‘‘It was very efficient. The tutorial was catchy. It was very catchy that we tried to explain the words to our friends, and they tried to explain it to us. ”**(S-6)**		
			‘My pronunciation also improved while communicating with my friends in the game. I now know what many medical terms mean. ”**(S-12)**		
			‘‘The course process was fun as well as being instructive. In addition, the content of the lesson enriched with this visual activity became catchier. "**(S-15)**		
			‘‘It happened in a useful way. It's understandable. "**(S-18)**		

Discussion

In this study, the efficiency of the 'MedTerm' card game, which was developed in the health field 'Elderly Care Principles and Practices I' course, on the achievements of first-year students studying in the Elderly Care associate degree program in medical terms was examined. In this context, the results of the MTAT pre-and post-test content analysis and the statistical analysis of the scores revealed that the MedTerm card game increased students' sound and partial understanding and their achievement in medical terms. In the literature, studies are showing that the Taboo form word game is effective in students' learning terms and increasing their achievement scores in different disciplines and at different grade levels. For example, Sallo (2020) stated in his thesis that 8th-grade students had difficulty speaking English in the classroom and got low grades in speaking skills. In this context, he applied the taboo word game as action research in his study. The result of the study showed that the students' speaking skills test scores were high and the students were confident in speaking in the classroom environment. Olimpo et al. (2010) developed and implemented a Taboo game consisting of 78 words and a dictionary named 'wiktionary' for each word to better understand the terminology in the topics of a biology course. The result of the study showed that the student's understanding and recall with the game were high.

In addition, it was determined that the students especially misunderstood the terms "cheyne-stokes respiration" (question number 21), "biot's respiration" (question number 22) and "kussmaul respiration" (question number 24) related to medical terms in the post-test. However, these words are basic terms that should be known professionally in the evaluation of the respiratory system.

In addition, the results of the semi-structured interview conducted at the end of the implementation in the study expressed positive opinions of all students about the process of the lesson, that it is understandable, catchy, entertaining, and includes visuality. One student stated that he/she could pronounce medical terms more efficiently with the game "MedTerm". In the literature, there are studies in which health field students express positive opinions that teaching the lessons with the GBL method card games is fun, enhancing, and beneficial (Boctor, 2013; Burleson & Olimpo, 2016).

Conclusion and Recommendations

Since there are no studies in the literature that use cards and board games on 'medical terms' at the associate degree level of the healthcare field and investigate the impact on their academic achievements, it is thought that this study may close the gap in the field and shed light on future research. In this context, our study is also a pilot study. In addition, it is considered to make applications that can correct the misunderstandings determined, to plan the study group by separating it into an experimental-control group, to implement the research by increasing the number of study group and the medical terms in the game 'MedTerm', in the future.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in JESEH journal belongs to the authors.

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Appendix-1. MTAT

Name-Surname:
Graduation High School:
Other (…….) Medical Vocational (……)

Please write the meanings of the Latin words below in Turkish.
1. Vital signs:……
2. Nasal cavity:……
3. Oral cavity:……...
4. Trachea:……
5. Uvula:……...
6. Parietal pleura:……
7. Visceral pleura:……
8. Alveoli:……..
9. Intercostal muscle:……
10. Ventilation:……
11. Expiration:……..
12. Inspiration:……
13. Medulla Oblongata:……
14. Eupnoea:……..
15. Apnea:……..
16. Tachypnea:……
17. Bradypnea:……
18. Hyperpnoea:……
19. Hyperventilation:……
20. Hypopnea:……
21. Cheyne- Stokes Respiration:……
22. Biot's respiration:……
23. Dyspnea:……
24. Kussmaul respiration:……
25. Anoxia:……
26. Hypoxia:……
27. Cyanosis:……
28. Pulse:……
29. Stroke volume:……
30. Cardiac Output:……
31. Tachycardia:……
32. Bradycardia:……
33. Thready pulse:……
34. Rhythmic Pulse:……
35. Arteria temporalis:……
36. Arteriacarotis:……
37. Arteria brachialis: ……
38. Arteriaradialis:……
39. Arteriafemoralis:……
40. Arteriapopliteal is:……
41. Hypothalamus:……
42. Vasodilatation:……
43. Vasoconstriction:……

44. Piloerection:……
45. Axillary path:……
46. Tympanic:……
47. Hyperthermia:……
48. Intermittent fever:……
49. Remittent fever:……
50. Constant fever:……
51. Recurrent fever:……
52. Hypothermia:……
53. Systolic blood pressure:……
54. Diastolic blood pressure:……
55. Atrophy:……
56. Hypertrophy:……
57. Dysphagia:…….