ACTA DIDACTICA NAPOCENSIA
Volume 13, Number 1, 2020 - DOI: 10.24193/adn.13.1.4

THE USE OF A STUDENT RESPONSE SYSTEM IN TEACHER TRAINING CLASSROOMS AND ITS EFFECT ON CLASSROOM ENVIRONMENT[1]

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Abstract: The purpose of this study was to implement a student response system-Kahoot to find out whether the inclusion of Kahoot in the teaching-learning process affected pre-service teachers' perceptions of the classroom environment in a compulsory Educational Sciences course. This study employed an experimental research design and the participants of the study were chosen according to the convenience sampling method. The data were collected by implementing The Classroom Environment Perceptions Scale of Pre-Service Teachers (CEPSPT) and analyzed using MANOVA. According to results, pre-service teachers who were in the Kahoot group perceived the cooperation, involvement, task orientation properties of the classroom environment significantly higher than those in the traditional instruction group. On the other hand, pre-service teachers who enrolled in the Kahoot group perceived the difficulty property of the classroom environment significantly lower than those who were in the traditional instruction group. In addition to these, the groups did not differ significantly on satisfaction and student cohesiveness dimensions of the classroom environment. The findings of this study were discussed in detail and some implications for future research were suggested.

Keywords: Classroom Environment; Kahoot; Pre-service teacher training; Student response systems

1. Introduction

In higher education, traditional teaching methods, such as lecturing, were related to negative learning experiences and less-ideal learning environments in which students showed signs of boredom, alienation, and disconnection from real-life experiences (Korkealehto & Siklander, 2018). Islim (2015) stated that traditional teaching methods are not motivating enough to encourage students to participate to achieve higher-order learning. In addition, Mayer et al. (2009) stated that when learners do not perceive that they are involved in the learning tasks, they are mostly not willing to study and achieve the goals of the course. Also, during the traditional teaching-learning process, due to the lack of interactivity between students and instructors and among students, instructors mostly do not understand whether students learned the subject, and students were provided with feedback about their learning (Islim, 2015). In this sense, the integration of active teaching-learning methods was suggested to engage learners in crowded courses and increase their interaction with the instructor (Korkealehto & Siklander, 2018; Mayer et al., 2009; Steinert & Snell, 1999).

Similarly, in Turkey, it has been observed that faculties of teacher training are not adequate in terms of including different teaching methods and techniques to teaching-learning process (Dikici, Gündogdu, & Yavuzer, 2006; Eret-Orhan, 2017; Kahramanoglu, 2010; Ozturk, 2004; Taskaya & Musta, 2008). In

[1] This article was presented as an oral presentation at the 7th International Congress on Curriculum and Instruction (ICCI-EPOK 2019) held on October 9-12, 2019 in Ankara

Received August 2019.

Cite as: Özüdoğru, M. (2020). The Use of a Student Response System in Teacher Training Classrooms and Its Effect on Classroom Environment. *Acta Didactica Napocensia,* 13(1), 29-42, https://doi.org/10.24193/adn.13.1.4

a study involving interviews with 43 senior class pre-service teachers, it was reported that instructors mostly used ineffective, traditional, or teacher-centered methods and techniques, often including PowerPoint presentations and lecturing. Moreover, instructors did not include discussions and technological materials in lessons but used techniques that require memorization (Eret, 2013). Simpson and Oliver (2007) suggested that the teaching model in higher education should shift from traditional methods to more active ones by including technology.

Steinert and Snell (1999) stated that active learning involves interactivity, involvement and participation of students so that they will no longer remain passive in the learning process. Moreover, active learning occurs in social settings by encompassing a variety of instructional techniques such as group studies, discussions, or clicker questions using student response systems (Andrews et. al., 2011; O'Flaherty & Phillips, 2015). One of the active learning methods to maximize student participation, interaction, and engagement are Student Response Systems (SRSs). SRSs are also referred to as Audience Response Technology (ART), Audience Response System (ARS), Personal Response System (PRS), Classroom Communication System (CCS), electronic voting systems or in general known as "clickers" (Caldwell, 2007; Draper & Brown, 2004; Han & Finkelstein, 2013; Kay & LeSage, 2009; Kay, Lesage et al., 2010; Mayer et al., 2009; Nicol & Boyle, 2003; Simpson & Oliver, 2007; Wolter et al., 2011). In the current study, Kahoot, one of the SRSs, was included.

Kahoot is one of the SRRSs and game-based learning platforms allow instructors to create surveys, questionnaires, and discussions (Ares et al., 2018). It was stated in the literature that Kahoot has many significant effects on students' learning and creates a positive classroom environment. The use of Kahoot or other SRSs may change the dynamics of traditional classroom structure by providing an equal chance to all students to reply to the instructor about their understandings and immediate feedback to students (Celik, 2015; Gok, 2011; Kay, Lesage et al., 2010; Knight & Wood, 2005; Mayer et al., 2009; Steinert & Snell, 1999). In this way, the inclusion of Kahoot in the teaching-learning process reveals the common misconceptions of students (Knight & Wood, 2005). In traditional classes, discussions are conducted generally with a limited number of students, not with the whole class and most of the students generally do not participate in discussions or answer questions voluntarily due to public risk, fear of making mistakes, or embarrassment (Caldwell, 2007). The rest of the class may deal with other occupations, which are not related to the course.

In addition to these, the inclusion of SRSs increases the interaction among students and between students and the instructor (Caldwell, 2007; Celik, 2015; Knight & Wood, 2005) and facilitate peer discussion (Korkealehto & Siklander, 2018). The inclusion of Kahoot in the teaching-learning process lets students assess their understanding of concepts as well as compare their understanding with their classmates since they can see how well they are doing relative to their peers (Caldwell, 2007; Draper & Brown, 2004; Kay & LeSage, 2009; Licorish et al., 2018; Simpson & Oliver, 2007; Steinert & Snell, 1999). In this way, students' sense of responsibility in the learning process increases, and their attitudes towards the course get more positive (Bicen & Kocakoyun 2018). Also, it was stated that SRSs make instruction fun (Caldwell, 2007; Dolezal et al., 2018; Korkealehto & Siklander, 2018; Licorish et al., 2018) and as a result, they increase the satisfaction property of the classroom environment.

Furthermore, in traditional teacher training classes, many students do not read assigned articles or pages from their coursebook because they believe that the material will be covered in class. Hence, to cover the topic during class lectures, there is little time for more interactive teaching-learning activities. On the other hand, if SRSs are used for brief quizzes on assigned readings or homework for formative assessment (Caldwell, 2007; Gok, 2011; Han & Finkelstein, 2013; Kay, Lesage et al., 2010), this may encourage pre-class preparation (Caldwell, 2007). In this way, Kahoot saves class time and this time can be spent in more productive ways than content coverage (Martyn, 2007). Eventually, learning is improved (Ares et al., 2018; Bicen & Kocakoyun 2018; Caldwell, 2007; Celik, 2015; Dolezal et. al., 2018; Gok, 2011; Han & Finkelstein, 2013; Korkealehto & Siklander, 2018; Licorish et al., 2018; Tan et al., 2018; Wolter et al., 2011).

It can be seen that the results of many studies showed that Kahoot increases the attention and involvement of students, their responsibility to learn and complete pre-class tasks, interaction among

students and between students and the instructor, facilitates peer discussion, improves positive attitudes towards the course compared to traditional teaching methods and increases the satisfaction of students during in-class studies. Involvement, satisfaction, cooperation, collaboration, difficulty, and task orientation are some of the properties of classroom environments, which were proposed and explained by Fraser & Fisher (1983) and Fraser (1998). As also mentioned above, whether students have fun about class activities is about the satisfaction property of the classroom environment. The cooperation dimension of the classroom environment is about whether students come together and work for a common goal and study to complete class tasks instead of competing with each other. Moreover, the involvement property of the classroom environment is higher in classes in which students participate in-class activities, discussions, and do supplementary studies and research after class. In addition to these, when the task orientation property of the classroom environment is taken into consideration, it is important to complete pre-planned tasks and continue working on the course subject. Student cohesiveness is about whether students know each other closely, help when asked, and support each other. In other words, it is about the sincerity of relationships. Difficulty property of the classroom environment is stated as the extent whether students find classwork hard or not.

The dimensions of the classroom environment were involved while evaluating different curricula (Fraser & Walberg, 1995). It was found that when different curricula were implemented, students perceived their classroom environment quite differently (Nix et al., 2005; Teh & Fraser, 1995). Moreover, it was revealed in many studies that classroom environment variables were good predictors of student cognitive and affective learning outcomes like achievement, attitude, engagement, satisfaction, academic self-efficacy, self-esteem, and self-regulation (Afari et al., 2013; Chionh & Fraser, 2009; Dorman et al., 2003; Fraser & Treagust, 1986; Fraser, 1998; Goh & Fraser, 1995; LaRocque, 2008; Velayutham & Aldridge, 2013). The results of several studies showed that when students learned better, they perceived their classroom environment favorably (Chionh & Fraser, 2009; Dorman et al., 2006; LaRocque, 2008). On the other hand, in classrooms where students perceived less satisfaction and involvement, and more friction, their achievement and attitude towards the course decreased (Goh & Fraser, 1995). Also, the classes in which there were fewer opportunities for student choice, collaboration, cooperation, and self-directed learning, the involvement levels, and the achievement of students decreased (Wang, 2012).

Kim et al. (1999) investigated the effects of science curriculum reforms in secondary schools. The results of the study showed that students who followed inquiry and negotiation-based curriculum perceived the classroom environment more positively than those who were trained through the academic-centered science curriculum. They also revealed significant relationships between classroom environment perceptions of students and student attitudes and concluded that appropriate student attitudes could be promoted in constructivist classes where students shared responsibility with teachers, discussed topics with their peers and instructors, and perceived the content and instruction relevant to them. Similarly, Chien (2007) investigated the learning environment where a case study teaching strategy was implemented. It was found that business management students' perception of teacher support, task orientation, and equity properties of the classroom environment was positively associated with attitudes towards the subject.

In the literature, many studies investigated the perceptions of elementary (Goh & Fraser, 1995; LaRocque, 2008), secondary (Chionh & Fraser, 2009; Fresko et al., 1989; Majeed et al., 2002; Telli et al., 2006; Velayutham & Aldridge, 2013), and university students' perceptions of the classroom environment (Coll et al., 2002, Fraser & Treagust, 1986; Walker, 2003). However, there is need for studies which investigate the effect of the classroom environment in teacher training classrooms. Hence, this study is aimed to inform practitioners and curriculum makers about the factors which may likely to influence the classroom environment like the inclusion of a teaching-learning method and the nature of the interactions experienced by students.

In the literature, there are many self-report studies about the perceptions of students like how much students enjoyed using SRSs or how helpful students found them in terms of learning or engagement (Ares et al., 2018; Dolezal et. al., 2018; Draper & Brown, 2004). However, there are quite limited experiential studies with control groups (Mayer et. al., 2009; Wang & Lieberoth, 2016). In the experiential study conducted by Wang & Lieberoth (2016), the effect of the use of points and audio on

the learning environment was investigated. They found that classroom dynamics were positively affected by the use of audio. Mayer et al., (2009) conducted a three-year quasi-experimental study and compared the achievements of educational psychology students who took the course in 2005 without questioning part, in 2006 (clicker group) and in 2007 (no-clicker group) at the University of California. The results of the study showed that students who used clickers to answer two to four questions per lecture scored significantly higher than those who were presented questions without clickers or with no in-class questions. In addition, they found that students who were not provided with questions performed at the same level as those who were provided questions using a paper-based system. For this reason, they concluded that the implementation of paper-based questioning does not have a significant effect on student learning. As can be seen, the experimental study compared the scores of students who took the course in different years. However, the current study was conducted by involving pre-service teachers who took the course in the same semester.

Finally, although the results of many studies suggested that the inclusion of an SRS, Kahoot, in the teaching-learning process resulted in positive outcomes when it was compared to traditional teaching methods and it should also be investigated in teacher training classes. Hence, this study aimed to find out whether the inclusion of Kahoot in the teaching-learning process affected pre-service teachers' perceptions of the classroom environment in an Educational Sciences course. For this purpose, the following question was asked:

1. Did the Kahoot group and the traditional instruction group differ significantly according to the perceptions of the classroom environment?

2. Methods

In this part of the study, research design, participants, the context of the study, data collection instrument, data collection procedures, and finally the data analysis process were explained.

2. 1. The Design of the Study

This study used weak-experimental research design, mainly the static-group comparison design (Creswell, 2012; Fraenkel, & Wallen, 2009). According to this design, two already existing, or intact, groups were used. This design was called by Fraenkel, & Wallen (2009) as nonequivalent control group design.

The current study was carried out in the fall semester of the academic year 2018-2019 for 10 weeks (from beginning of October 2019 to the end of the December except for midterm and final weeks) at a public university located in the Aegean Region in Turkey. In this study, subjects were introduced in both groups by the instructor. After PowerPoint presentations, the instructor included Kahoot applications in the Kahoot group. In the traditional instruction group, there were not Kahoot games but the questions which were included during the Kahoot game were asked during the presentation process. Each Kahoot application consisted of 5 to 6 multiple-choice questions about the topics of Principles and Methods of Instruction course.

2. 2. Participants of the Study

In this study, pre-service teachers were chosen according to the convenience sampling method. Convenience sampling involves participants who are available and accessible at the time or those to whom researchers have easy access, which suits the purposes of the study (Cohen et al., 2007; Gall, et al., 2003). In this study, 169 pre-service teachers were included. Among the 169 pre-service teachers, 99 (58.6%) of them learn the subjects through Kahoot and 70 (41.4%) of them were not included in Kahoot games. Among the 99 pre-service teachers who were included in the Kahoot group, 49 (49.5%) of them were from Mathematics Teaching Department and 50 (50.5%) of them were from the Turkish Language Teaching Department. Also, among the 70 pre-service teachers who were included in traditional instruction group, 29 (41.43%) of them were from the Department of Early Childhood Education and 41 (58.57%) of them were from Elementary Education-Classroom Teaching Department.

2. 3. The Context of the Study

This study was conducted in an Educational Sciences course, the Principles and Methods of Instruction. In Turkey, this course is one of the compulsory courses and aims to equip pre-service teachers with knowledge and skills to implement teaching strategies, methods, comprehend and put principles of planned instruction into practice, use suitable teaching materials and tools, become aware of teachers' duties and responsibilities and to comprehend relations of these with teacher qualifications as designed by the Higher Education Council of Turkey (Yüksek Öğretim Kurumu, 2007).

The content of this course includes: Basic concepts of education (education, teaching, learning, program etc.), goals and objectives of education (determination of goals and objectives in education, types of objectives, the classification of objectives and Bloom's taxonomy), planning of instruction (types of plans, the importance of planning, etc.), teaching theories and models (Gagne's theory on learning and instruction, Mastery learning, Keller's individualized instruction, Carroll's model of school learning, Bloom's mastery learning, constructivism, multiple intelligence theory, etc.), teaching strategies (teaching through presentation, discovery learning and teaching through research and investigation and cooperative learning), methods of teaching (lecturing, discussion, case study, demonstration, project-based learning, problem-based learning etc.), teaching techniques (question and answer, brainstorming, role-playing, concept mapping, different discussion techniques, etc.) (YOK, 2007).

2. 4. Data Collection Instrument

In this study, data were collected by implementing The Classroom Environment Perceptions Scale of Pre-Service Teachers (CEPSPT) which included six factors. The CEPSPT was 5-point (ranging from 1-completely disagree to 5-completely agree) Likert scale and developed by Ozudogru & Aksu (2019). Satisfaction scale consisted of 10 items (e.g., Students look forward to coming to this course), Cooperation scale consisted of 7 items (e.g., Each student tries to fulfill his/her duties fully in individual or group works), Involvement scale included 7 items (e.g., Students strive to complete the activities that are being conducted in class), Task Orientation scale included 5 items (e.g., The learning tasks are planned clearly and carefully), Student Cohesiveness scale consisted of 5 items (e.g., Students know each other well), and Difficulty scale included 4 items (e.g., Students are challenged in group work conducted in class.).

In the current study, reliability was examined by Cronbach's Alpha coefficients of internal consistency were calculated for each sub-scale of the CEPSPT. The reliability coefficient was found 0.85 for Satisfaction, 0.84 for Cooperation, 0.77 for Involvement, .83 for Task Orientation, 0.77 for Student Cohesiveness, and 0.72 for Difficulty scales which are higher than 0.70 (Hair et al., 2014). Moreover, the reliability coefficient of the scale as a whole was also calculated as 0.91.

2. 5. Data Collection Procedures

In this study, pre-service teachers were assigned homework from their coursebooks to read before class time. In the class, the subject was introduced by the instructor. After PowerPoint presentations, the instructor implemented Kahoot. Each Kahoot application consisted of 5 to 6 multiple-choice questions about the subjects of Principles and Methods of Instruction course per lecture. Kahoot was launched by the instructor on a web browser in a laptop connected to a large screen. Kahoot game was projected to the board by the laptop connected to the projector to be seen by all class members. Pre-service teachers logged into the Kahoot by entering a game PIN number and a nickname. Kahoot can be played in two modes: players vs. players and teams vs. teams. In the current study, players vs. players mode were included and each pre-service teacher competed against other class members. The questions were shown on the large screen along with four alternative answers which were shown in different colors with associated graphical symbols. The students gave their answers by choosing the color and symbol which corresponds to the correct answer. In Figure 1, an example Kahoot screen was shown:

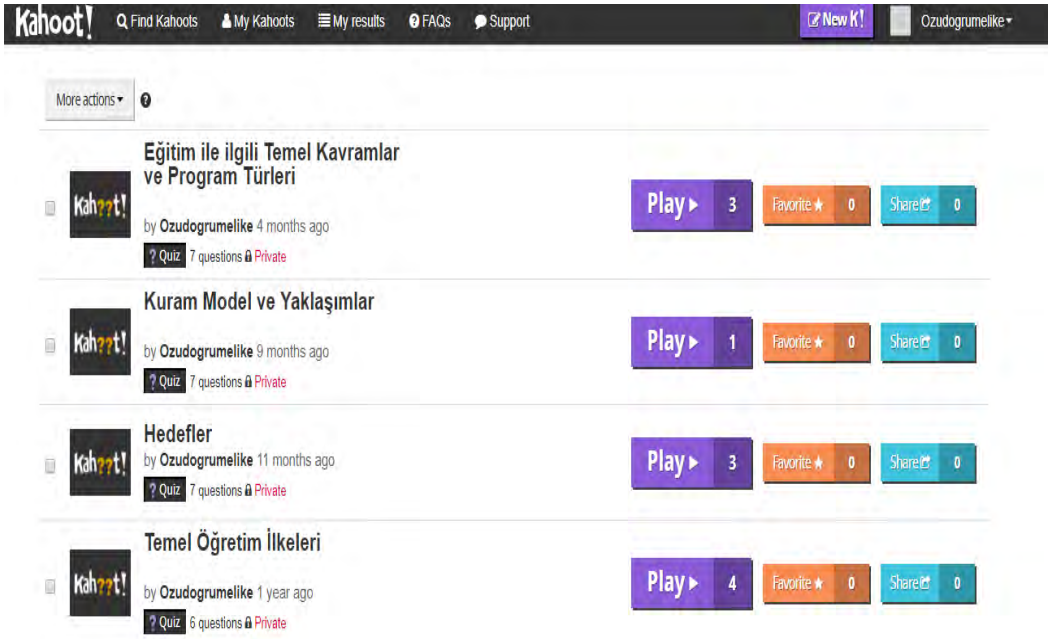

Figure 1. *Kahoot Screen*

After each question, all responses were presented in chart form by showing the distribution of students' answers and the five best players before a scoreboard. Then students discussed test questions and tried to explain their ideas and thoughts trying to convince each other on the right answer. The answers of students were also reviewed and discussed by the instructor and they were provided with feedback about questions answered wrong. To resemble the real competitive atmosphere similar to quiz shows watched on TV and to increase the engagement of pre-service teachers in the course, the music of Kahoot was played. Finally, since Kahoot let instructors download the results from the quiz in an Excel spreadsheet, the learned subjects and the subject that must be practiced again were detected and the improvement of students in terms of learning was followed throughout the semester. The Kahoot applications took 15-20 minutes in terms of answering and discussing questions.

2. 6. Data Analysis

In this study, descriptive statistical analysis techniques were used. The means (*M*) and standard deviations (*SD*) were indicated (Tabachnick & Fidell, 2007). Moreover, in order to analyze the difference between the Kahoot group and the traditional instruction group according to classroom environment perceptions, MANOVA was conducted because there were six dependent variables (Field, 2009; Tabachnick & Fidell, 2007). Before conducting MANOVA, the assumptions of univariate, multivariate normality, homogeneity of variance, homogeneity of covariance, and outliers were checked in order to explore the appropriateness of the data for MANOVA (Field, 2009; Tabachnick & Fidell, 2007). For the analyses, SPSS 22 was used and the alpha level was determined as .05.

The homogeneity of variance assumption was checked with Levene's Test to determine whether the variances in different groups were equal (Field, 2009). According to the results of Levene's test, the homogeneity of variance assumption was not violated for the dependent variables which are Involvement, F (1, 167) = 3.75, p>.05; Task Orientation F (1, 167) = .89, p>.05; Student Cohesiveness F (1, 167) =.22, p>.05; Difficulty, F (1, 167) = 2.72, p>.05. However, the homogeneity of variance assumption for Satisfaction F (1, 167) = 7.92, p<.05; Cooperation, F (1, 167) = 7.08, p<.05; was violated. Hence, the alpha level for satisfaction, cooperation and was determined as .04 as stated by Field (2006) to keep very tight Type I error control.

In this study, Mardia's test results indicated a significant pattern (p< .05). That means the multivariate normality assumption was violated for MANOVA (Tabachnick & Fidell, 2007). However, Tabachnick

and Fidell (2007) stated that a sample size which includes about 20 observations in the smallest cell ensures robustness to multivariate normality.

Furthermore, the homogeneity of covariance assumption was checked with Box's test (Field, 2009). The result of Box's test should be non-significant if the matrices are the same (Tabachnick & Fidell, 2007). In this study, Box's M= 41.27, F (21, 81082.04) =1.89, p< .05 which is significant. It can be said that the homogeneity of covariance assumption was violated. Hence, Pillai's Trace values were reported in order to check the significance of the MANOVA model.

3. Results

In order to investigate the classroom environment perceptions of pre-service teachers who enrolled in the Kahoot group and traditional instruction group in the Principles and Methods of Instruction Course, MANOVA was conducted. Before interpreting the results of MANOVA, descriptive statistics were explained in Table 1.

Table 1. *Mean scores and standard deviations for the factors of CEPSPT*

Departments	**Satisfaction**		**Cooperation**		**Involvement**		**Task Orientation**		**Student Cohesiveness**		**Difficulty**	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Kahoot Group	36.66	3.98	26.66	3.24	29.24	2.76	21.31	2.53	17.69	3.33	9.01	2.61
Traditional Instruction Group	35.27	5.19	25.06	4.27	26.89	3.63	19.00	3.03	16.83	3.43	10.14	2.88

According to descriptive statistics, pre-service teachers who were in Kahoot group perceived satisfaction (M=36.66, SD=3.98), cooperation (M=26.66, SD=3.24), involvement (M=29.24, SD=2.76), task orientation (M=21.31, SD=2.53) and student cohesiveness (M=17.69, SD=3.33) dimensions of classroom environment higher than those who were in traditional instruction group. On the other hand, pre-service teachers who were in the Kahoot group perceived the difficulty (M=9.01, SD=2.61) property of the classroom environment lower than those who were in the traditional instruction group.

According to MANOVA analyses, the independent variable, 'group' in which pre-service teachers learned had a significant effect on dependent variables F (6, 162) = 5.54, p<.05. Moreover, the strength of the relationship between pre-service teachers' group in which pre-service teachers learned and their classroom environment perceptions was assessed by partial eta square ($\eta 2$) as a measure of effect size (ES). The ES value ($\eta 2$ = 0.173) indicated that the class in which pre-service teachers learned accounted for about 17.3% of the variance in perceptions of the classroom environment.

After checking the significant results in MANOVA, univariate analyses were also interpreted. Before checking ANOVA results, Bonferroni correction was conducted by dividing alpha value to the number of dependent variables (.05/6 = .008) for Involvement, Task Orientation Student Cohesiveness, Difficulty dimensions of the classroom environment to keep very tight Type I error control. However, since the homogeneity of variance assumption for Satisfaction and Cooperation was violated, the alpha level for satisfaction and cooperation was determined as .04. Hence, Bonferroni correction was conducted by dividing alpha value to the number of dependent variables (.04/6 = .006) as stated by Field (2006) in order to keep very tight Type I error control.

Table 2. *Multivariate and Univariate Analyses of Variance for the Perceptions of Classroom Environment according to groups of Pre-Service Teachers*

		ANOVA F (1,167)					
Variable	**MANOVA* F (6,162)**	**Satisfaction**	**Cooperation*** **	**Involvement** **	**Task Orientation** **	**Student Cohesiveness**	**Difficulty** **
Group	5.54	3.85	7.65	23.01	29.00	2.65	7.09

*$p < .05$, **$p < .008$, ***$p < .006$

According to the results which were indicated in Table 2, group variable has a significant effect on Cooperation, F (1, 167) = 7.65, p<.00; Involvement, F (1, 167) = 23.01, p<.00; Task Orientation, F (1, 167) = 29.00, p<.00; Difficulty, F (1, 167) = 7.09 p<.00. However, group variable has an insignificant effect on dependent variables which are Satisfaction F (1, 167) = 3.85, p>.05; Student Cohesiveness F (1, 167) = 2.65, p>.05.

According to univariate results, the group in which pre-service teachers learned had a significant effect on the perceptions of the classroom environment. The pre-service teachers who were in the Kahoot group perceived the cooperation, involvement, task orientation properties of the classroom environment significantly higher than those who enrolled in the traditional instruction group. On the other hand, pre-service teachers who enrolled in the Kahoot group perceived the difficulty property of the classroom environment significantly lower than those who were in the traditional instruction group. In addition to these, pre-service teachers who were in both groups did not differ significantly on satisfaction and student cohesiveness dimensions of the classroom environment.

4. Discussion and Conclusion

The purpose of this study was to implement a student response system-Kahoot in a teacher training class to find out whether the inclusion of Kahoot in the teaching-learning process affects pre-service teachers' perceptions of the classroom environment in an Educational Sciences course. The findings of the study showed that pre-service teachers who were in Kahoot group perceived cooperation, involvement, and task orientation dimensions of classroom environment significantly higher and difficulty property of classroom environment significantly lower than those who were in the traditional instruction group. However, pre-service teachers who were in both groups did not differ significantly on satisfaction and student cohesiveness dimensions of the classroom environment.

These findings were in line with the literature that the inclusion of Kahoot in the teaching-learning process increased involvement of students (Bicen & Kocakoyun 2018; Celik, 2015; Dolezal et al., 2018; Han & Finkelstein, 2013; Kay, Lesage et al., 2010; Korkealehto & Siklander, 2018; Knight & Wood, 2005; Licorish et al., 2018; Tan et al., 2018), interaction among students and between students and the instructor (Caldwell, 2007; Celik, 2015; Knight & Wood, 2005). The reason for this result might have stemmed from the fact that pre-service teachers who were involved in Kahoot games asked questions, explained their opinions to their peers, and made use of others' ideas. In this way, interaction among students was affected positively which resulted in increased cooperation among pre-service teachers than those who were in the traditional instruction group which was also stated by Caldwell (2007) and Knight and Wood (2005). It was stated that the classes which were highly cooperative, result in favorable student outcomes (Mason et al., 2013; Millard, 2012; Patrick et al., 2007; Walker, 2003; Wang, 2012). Similarly, Chien (2007) stated that business management students did the work together in groups and discussed, and learned much from each other. Similarly, Afari et al. (2013) found that when Mathematics games were included in the teaching-learning process, college

students had significantly higher involvement, satisfaction, personal relevance, teacher support, and academic efficacy scores. The inclusion of a different approach in the college-level introductory statistics course also resulted in different classroom environment perceptions. In the study conducted by Strayer (2012), statistics students indicated that they were less satisfied with the task orientation property of flipped learning classroom environment but more open to cooperative learning and innovative teaching methods.

The inclusion of Kahoot in the teaching-learning process, besides involvement and cooperation dimensions of the classroom environment, also affected the task orientation, and difficulty dimensions of the classroom environment positively. The results of the current study showed that pre-service teachers who were in Kahoot group perceived task orientation dimension of the classroom environment significantly higher than those who were in the traditional instruction group. It can be said that pre-service teachers were aware of the importance of completing planned activities and staying on the subject matter. In this way, class time was spent effectively and instructors consistently encouraged and moderately challenged pre-service teachers to realize learning in class. Hence, it can be said that the inclusion of Kahoot contributed to pre-service teachers' know exactly what they were expected to do during class. In this way, both instructors and pre-service teachers complied with the plan and were not sidetracked in the course as also stated by den Brok et al. (2005).

Moreover, it was found in the current study that pre-service teachers who were in the Kahoot group perceived the difficulty dimension of the classroom environment significantly lower than those who were in the traditional instruction group. The reason for this result might be that the inclusion of Kahoot to the teaching-learning process might have decreased the perceived difficulty of the course by providing a controlled race in activities and the feeling of fun while learning. Yin and Lu (2014) found that competition among freshmen students was positively correlated to learning. As in the current study, controlled competition might have facilitated pre-service teachers' learning by providing challenging tasks in the course which resulted in exciting learning experiences. LaRocque (2008) found that the difficulty dimension of the classroom environment was significantly related to elementary school students' (4^{th}, 5^{th}, and 6^{th} grade) mathematics and reading achievement in a negative direction. In other words, when students perceived their classroom environment as relatively more difficult, they tended to have lower reading achievement.

It was found that pre-service teachers who were in both groups did not differ significantly on the student cohesiveness dimensions of the classroom environment. In the literature, the findings of various studies different from the findings of the current study indicated that the student cohesiveness aspect of the classroom environment is an important factor in explaining outcomes, particularly affective ones, in various subject matter areas (Chionh & Fraser, 2009; Dorman et al., 2003; Fraser, 1998; Majeed et al., 2002; Velayutham & Aldridge, 2013). The student cohesiveness dimension of the classroom environment is about the intimacy of relationships and related to how students know each other closely, help, support each other, and enjoy the class. Different from the findings of the current study, Velayutham and Aldridge (2013) found that the supportive relationships of secondary school students with their peers increased their motivation and self-regulation in science. Student cohesiveness dimension is important, particularly for secondary school students because of their being in the critical period in which the effect of peers is more important. Since pre-service teachers who were involved in the current study were senior students, they have already known, helped, supported each other and enjoyed being in the class with their friends, which might have been the reason for the insignificant results in these two groups according to student cohesiveness and satisfaction dimensions of the classroom environment.

Also, pre-service teachers who were in both groups did not significantly differ on the satisfaction dimension of the classroom environment. The reason for this result might have stemmed from the fact that as also revealed by LaRocque (2008) that the satisfaction of students diminishes as they get older. In addition, different technological problems such as poor internet connection and the music behind the Kahoot screen might have affected the satisfaction of some pre-service teachers in the Kahoot group. Hence, pre-service teachers in both groups had similar satisfaction scores related to the classroom environment.

In this study, the effect size was .17. According to Cohen (1977), an effect size of 0-2 was considered low. The relatively low eta^2 obtained from the implementation of the CEPSPT shows that the learning environment for these two classes included in the current study is similar since they were taught by assigning readings from the same textbook. They later came to class to hear the presentations of the subjects using PowerPoints from the instructor. Also, both groups learned the same course content which was designed by YOK (2007) in Turkey.

All in all, the findings of this study might provide useful results for instructors and researchers to design instruction by sensitizing themselves to the positive and negative influences of classroom environment perceived by pre-service teachers when a different teaching method or a material was included. For more clear and deep conclusions and educational implications, however, future research is needed. In this study, the results were based on self-report data which may be one of the limitations of this study because of having the potential for flawed self-assessments. Therefore, it is suggested that future studies might verify and enrich the results by including a wide range of qualitative analyses. The classroom environment perceptions of pre-service teachers might be investigated through the inclusion of case studies, classroom observations, and in-depth interviews in order to understand teacher training classroom environments comprehensively.

Moreover, in the current study, although data were collected by pre-service teachers studying in different departments, the perceived differences in classroom environments according to different departments were not examined. Future studies can examine how the inclusion of different teaching-learning methods influences classroom environments perceptions pre-service teachers learning in different departments.

According to the study, it appears that maintenance of a suitable classroom environment is conducive to higher levels of student participation, collaboration, and the completion of planned class tasks thus decreased difficulty in terms of classwork. Instructors have important roles and responsibilities in achieving positive classroom environments by encouraging higher levels of involvement, cooperation, and interaction among students, and providing students with support, help, and friendship, as well as being task-oriented and submitting the content in moderate difficulty. Hence, it is suggested that instructors should be provided with quality in-service programs about the importance of classroom environment dimensions.

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