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ORIGINAL RESEARCH

The Effect of Using Student Response System on Achievement and Achievement Emotions in An English Course

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Abstract
This study investigates the effect of student response system (SRS) on students' achievement and achievement emotions in an English course. The participants were 9th grade students ($n=83$, 40 female and 43 male) attending a high school in Turkey. Study involved one experiment and two control groups. In the experimental group, SRS was used to ask questions and to provide immediate feedback to the students. Paper and pencil form of the same questions (that were used in the experimental group) were asked to the students in the control group 1 and immediate feedback was provided. These questions were not used in the control group 2. Before and after the implementation, the English Achievement Test and Class Related and Test Related Achievement Emotions Questionnaires were administered to the experimental and control groups. Mixed ANOVA was used to examine the within and between group differences. Semi-structured interviews were carried out with experimental group students. The results showed that using an SRS had statistically significant effect on students' achievement in English. In terms of the achievement emotions, the SRS had a statistically significant effect on decreasing students' test anxiety. The SRS and using questions and immediate feedback in a paper and pencil format positively impacted students' class-related boredom and enjoyment, and test relief. The results of the interviews supported these findings. Students reported that lessons with SRS were more enjoyable and SRS helped them to learn the subject matter better. They also reported that SRS helped them for the self-assessment of their progress. The findings of the study also showed that technical problems that arise from the lack of internet infrastructure might cause time management problems during the implementation of SRS.

Keywords Student response system · Achievement emotions · English course achievement · English language teaching · Secondary school students

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1 Introduction

Today, learning any second language has become a vital requirement to be able to follow changes in the field of science, technology, tourism, economy, and many others and to interact individuals from different cultures (Akkaş & Coker, 2016). In this regard, foreign language teaching constitutes a significant part of the K-12 curricula in Turkey and many other countries (Demirpolat, 2015). However, the general problem expressed by scholars, teachers, bureaucrats, students, and parents is that teaching a foreign language in Turkey is not at the desired level (Sarıçoban & Öz, 2014). In 2010, 90% of K-12 students were at the beginner's level in English proficiency, although they received approximately 1400 h of English lessons in total during primary and secondary education (Akpınar & Aydın, 2009; Paker, 2012). Supporting this finding, the English Proficiency Index work conducted from 2011 to 2019 also showed that students' proficiency level is too low and that, in the last eight years, there has been no significant increase (EF EPI 2020).

The report written by the Turkey Economic Policies Research Foundation (TEPAV) revealed that the reasons for this failure in Turkey are that students find English lessons difficult and boring. In addition, students believe that even if they pass the class, their English proficiency level decreases and this negatively impacts their motivation toward learning English (TEPAV, 2014). In another study, (Baran and Halıcı (2006) stated that factors affecting foreign language education in children are age, intelligence, attitudes, motivation, fear, and self-confidence. Aydın and Zengin (2008) stated that anxiety is an important factor in foreign language teaching.

Various studies have been conducted to solve the problems in foreign language teaching. For example, Paker (2012) stated that students and teachers should perceive English as a communication tool and organize all learning and teaching processes accordingly. He also stated that the learning environment should be stress-free, as much as possible, and that the setting should be a place where all students can enjoy learning. In addition, language lessons should attract the interests of students such as integrating computer games into learning and diversifying the content of lessons (TEPAV, 2014). Similarly, Baran and Halıcı (2006) stated that the use of technological tools and equipment in English language teaching is important because it encourages students and makes learning more efficient for them. Solak and Bayar (2015) also suggested that English teaching should focus on practice, not solely on memorizing, and on encouraging students to communicate. In addition to all mentioned above, there is another important factor that has to be taken into account in a teaching and learning environment: what students feel (Pekrun, 2006).

It is necessary to take the affective characteristics of students into account in every field of education and to regulate the educational environments accordingly. Pekrun et al. (2011) stated that emotion towards achievement is vital for student motivation, learning, performance, identity development, and health. Although emotions are important in understanding students' learning and achievement, traditional teachers often focus mostly on the cognitive side of learning and teaching and tend to neglect the emotional side (Buil et al., 2016; Daniels et al., 2009; Ismail, 2015; Putwain et al., 2013).

The number of studies examining emotions has increased since the early 1980s (Pekrun, 2000). However, there is no universal and common definition of the concept of emotion. The main reason is that emotions have been studied in different disciplines, such as psychology, neurology, sociology, and physiology, and these disciplines approach the concept of emotion from different points of view (Artino et al., 2012). When the common views from different perspectives were investigated, it is seen that emotion is defined by referring

to concepts such as fear, anxiety, happiness, and anxiety. But, Pekrun (1992) discussed the concept of emotion by using a more general framework. According to Pekrun (1992), emotions stem from one's own experiences and emotions are discrete phenomena. Looking at the concept of emotion in this respect allows us to differentiate between emotions and their expressions like motivation.

In this study, the concept of emotion from Pekrun's (1992) framework is adopted. That is, the emotions experienced in learning environments consist of many components such as cognitive, affective, psychological, and motivational (Pekrun & Stephens, 2010). Emotions play an important role in students' academic achievements, and they help us understand the learning processes of students and their achievement (Peixoto et al., 2015; Pekrun, 2005; Pekrun et al., 2006). However, emotions are traditionally neglected in educational researches (Pekrun, 1992; Pekrun et al., 2004). Studies that examine the role of emotions on learning and achievement began after the 1990s, and thus the importance of emotion in the learning environment has begun to change (Pekrun & Frese, 1992). These studies mostly focused on test anxiety while other feelings, such as pride, anger, shame, and enjoyment that could affect academic achievement, were not considered (e.g. Akgün, Gönen, & Aydin, 2007; Aydin, 2009; Dursun & Bindak, 2011; Hatice et al., 2006; Kidson & Hornblow, 1982; Lowe & Ang, 2012; Manley & Rosemier, 1972; Nasser et al., 1997).

Achievement emotions are defined as the emotions that are related to the activities and the consequences of achievement (Pekrun, 2000; Pekrun et al., 2006). In other words, all emotions associated with students' learning and achievements in learning and teaching environments are achievement emotions (Schutz et al., 2007). For example, the pleasure of learning, the feeling of boredom in the classroom, anger when dealing with a difficult task are achievement emotions (Pekrun, 2006). Most studies on achievement emotions are focused on results-oriented emotions, which are generally related to test anxiety, pleasure, and pride when academic goals are achieved, shame, and anger when failure is encountered (Pekrun, 2000, 2006; Pekrun & Frese, 1992; Weiner, 1985). Activity-focused emotions such as boredom are often ignored in such studies (Pekrun et al., 2007; Schutz et al., 2007). However, achievement emotions are not just about the activity of achievement. Action- and result-oriented emotions are different from each other (Pekrun, 2006). Pekrun (2006) stated that thinking an action or a phenomenon is within or out of their control has an impact on the emotions of individuals. A similar situation applies to learning environments. Individuals' thoughts that acting is within or beyond their control will trigger different kinds of achievement emotions. Besides, the level of importance of achievement will lead to the emergence of different emotions (Pekrun, 2006; Pekrun & Stephens, 2010). Pekrun (2006) stated that achievement emotions can be grouped into two categories: the importance given to the learning situation and the degree of learning effectiveness. The importance of learning for students is classified into positive or negative (e.g., the student considers learning a foreign language as important or insignificant), and the degree of learning effectiveness is classified as activating (e.g., students want to work more for what they see as important) and deactivating (e.g., not wanting to study because the subject is trivial) (Pekrun & Stephens, 2010; Schutz et al., 2007). Research has shown that emotions are frequently observed in achievement contexts (Pekrun, 1992).

Emotions play an important role in learning a foreign language. Pishghadam et al. (2016) examined how foreign language skills affect students' emotions and stated that it is important for students to control their feelings and emotions. In this study, students experienced anger when listening, felt pride and enjoyment when speaking, felt shame when listening and speaking, felt hope, boredom, or hopelessness when writing and listening, and felt anxiety in using all language skills. In another study that examines students' academic

achievement emotions and the contribution of these emotions to their English achievements, there was a strong positive relationship between achievement emotions and English academic achievement (Ismail, 2015). So, it is important to maintain positive emotions in the learning environment to make learning effective in language classes (Hoopingarner, 2011).

To make learning more effective, it is becoming more common to use educational technologies (Bardakci & Keser, 2017). While we question whether we should use it or not, we now question how we use technology in education (Hoopingarner, 2011). It is generally accepted that the technologies used in foreign language teaching since the 1960s (Ahmad, 2012; Aydin, 2013) have made learning effective, easy, and attractive (Altun, 2015; Hoopingarner, 2011). Most students and teachers believe in the contribution of technology in language teaching (Altun, 2015; Baz, 2016; Yükselir, 2016; Zhao, 2003). Also, it has been demonstrated that the use of technology provides an experiential learning environment that increases the interaction of students' motivation and academic achievement and that frees teachers from being dependent on a single source of information in learning (Lee, 2000). In general, the use of technology in listening, speaking, writing, and reading skills (Demirel, 2014), which are considered as the four basic skills in foreign language teaching, had positive effects on learning (Ahmad, 2012).

The development of digital technologies and modern learning-teaching techniques "has led to changes in the way how we learn and teach" (Wankel & Blessinger, 2013, p.3). With the introduction of computers and the internet into classrooms, instructional materials used in the classroom environment have increased considerably. One of these technology is "Student Response System" (SRS) that is frequently a subject of research internationally (i.e., Aslan & Şeker, 2017; Cain & Robinson, 2008; Caldwell, 2007; Habela & Stubbs, 2014; Hoekstra & Mollborn, 2012; Laxman, 2011; Morgan, 2012; Titman & Lancaster, 2011). Although SRS was created for use in business and government circles to obtain the ideas of people who do not want to express their opinions verbally (Rodriguez, 2010), it is now effectively used in educational settings (Addison et al., 2009; Balta & Tzafilkou, 2019; Cardoso, 2011; Dervan, 2013; Filer, 2010; Hedgcock & Rouwenhorst, 2014; Jones et al., 2012; Walker & Barwell, 2009; Walker et al., 2018). SRS is an electronic system that provides instant feedback when students answer questions asked by the teacher during face-to-face education (Costello, 2010). This system consists of a transmitter device, such as a smartphone or a tablet computer, that allows students to answer and software the publish the questions and collect the responses on a computer. With this system, the teacher opens the questions for the students to get access through the system. Students answer these questions with their hands-on devices and instantly see their answers on the Interactive Smart Board, which is required for the system to be implemented in the classroom. Questions can be answered individually or in groups. The teacher can give feedback to the answers to these questions to an individual student, a group, or to the whole class. In this way, the teacher can evaluate the classes' learning, and if necessary, add additional instruction.

Many studies are investigating the effects of using an SRS in educational settings. The results from these studies showed that the use of a SRS system increased students' engagement, active participation, and interactions in the course. For example, it has been found that it provides a fun environment, provides various learning opportunities and helps increase academic achievement, serves a positive role in improving students' engagement and attitudes, contributes to student assessment, and provides a friendly competitive environment for students (Agbatogun, 2013; Balta & Tzafilkou, 2019; Caldwell, 2007; Cardoso, 2011; Çelik, 2015; Khan & Khan, 2019; McDonough & Foote, 2015; Mork, 2014; Oigara & Keengwe, 2013).

In terms of English courses, several studies suggest that an SRS is useful for teaching English (Agbatogun, 2013; Balta & Tzafilkou, 2019; Cardoso, 2011; Mork, 2014; Rodriguez & Shepard, 2013). Generally, it was found that using an SRS in English classes increased the interactions among students and between students and teachers (Cutrim, 2008; Svetanant & Nakazawa, 2014; Yu et al., 2014) and encouraged students to engage in further interaction (Yu et al., 2014), thus enabling students to participate more actively in the classroom (Cutrim, 2008). Using an SRS in foreign language courses increased the students' motivation (Cardoso, 2011; Kaya & Balta, 2016; Svetanant & Nakazawa, 2014); there was no difference among male and female students in this respect (Kaya & Balta, 2016). In addition, the use of an SRS decreased the anxiety and stress level that students felt in their language lessons (Svetanant & Nakazawa, 2014; Yu et al., 2014) and provided students a way to compare themselves with their friends (Cardoso, 2011). Students generally had positive opinions about the system (Agbatogun, 2013; Cardoso, 2011; Kaya & Balta, 2016; Yu et al., 2014).

In terms of the usefulness of SRS Davis'(1989) technology acceptance model (TAM) presents a good theoretical perspective. TAM is generally based on two assumptions as perceived usefulness and perceived ease of use and try to find out answer what are the reasons that lead to people to accept or reject the technology use. According to Davis people generally tend to use or not use a technological device to the extent that they believe it will be beneficial to perform their occupation. This is referred to as perceived usefulness. Besides this no matter how useful the device is, people sometimes may believe that it is too difficult to use and so using the device is not worth it. And this belief is theorized as perceived ease of use.

As in another field, the benefit that people will have using a technological device is important for students too. As people expect positive performance using a tool, students may have the same expectation for learning. So, any device that they will use for learning activities may be very important for them in terms of usefulness. While it is important there is another side of technology usage. The difficulty of using it to his / her advantage. If it necessitates a big effort to use and learn how to use it, a student may not want to use it although he/ she knows how it will be beneficial for him/her. For this reason, freedom from difficulty, or great effort (Davis, 1989) is one of the issues that students consider. People generally prefer to use an application that they perceived easier to use.

Although the theory of TAM is conceptualized for developing new software for vendors, it is also understood that it could be implemented by organizational information system managers for evaluation of the vendor offerings (Ingalls, 2020). Using Davis' integrative theory for using technology in a high school as a teaching and learning tool will allow teachers to decide about using SRS from the students' perspective.

In sum, many studies have examined the effects of SRS on students' learning. However, there are few studies on how the SRS affects student emotions and their learning process (i.e., Buil et al., 2016; Cutrim, 2008). More studies investigating the effects of SRS on students' emotions are needed. In this study, the effects of using an SRS on students' achievement emotions related to English courses and tests and students' academic achievement in English are investigated.

2 Methods

2.1 Research Design

This study investigates the effect of using SRS on students' achievement and achievement emotions toward English courses and tests. A mixed research method with a sequential explanatory design was used in which the qualitative data were collected to complement the quantitative findings (Creswell & Creswell, 2018). This design is characterized by the collection and the analysis of quantitative data in the first phase of research followed by the collection and the analysis of qualitative data in a second phase that builds on the results of the initial quantitative findings. Weight typically is given to the quantitative data, and the mixing of the data occurs when the initial quantitative results inform the secondary qualitative data collection. Thus, the two forms of data are separate but connected (Creswell, 2009, p.211). In the current study, firstly, the experimental design was used to examine whether there are statistically significant effects of using SRS on students' achievement and achievement emotions toward English courses and tests. Following the implementation of the experiment, a qualitative design was used for better understanding how and why SRS has these effects, through exploring students' views about using SRS.

Before conducting the study, permission was granted from the provincial directorate of national education and from the students' parents whose children voluntarily participated in the study. Before the study all the aspects of the study and the process of it were explained in detail to both parents and the students. Besides this after the experiment, the same SRS was applied with both control groups and so, the same application was carried out for all control and experiment groups. In addition, the interviews at the end of the study were done on a voluntary basis.

The study involved three groups: one experimental group and two control groups. In all groups, the English course teacher was the researcher (the first author). The implementation of SRS took eight weeks in regular classroom hours. In the experimental group, 37 multiple choice questions related to the objectives of the 9^{th} grade English curriculum were asked through the SRS and immediate feedback regarding the students' answers was provided. Socrative software was used as a tool for the SRS. In control group 1, a paper and pencil version of the same questions (as the experimental group) was used. In control group 1, after students had finished the test, immediate feedback was provided. In control group 2, these questions were not used, and the lessons were routinely handled following the national curriculum without changing the course flow. In all three groups, the 9th-grade curriculum was carried out using the interactive smartboard as it is a common tool used nationwide in regular English courses in Turkey. After eight weeks of experimental implementation, SRS was used in control groups to eliminate the possible disadvantages those students experienced by not using SRS.

The quantitative data were collected through an achievement test and Achievement Emotions Questionnaire, using a pretest–posttest control-experimental group design. Qualitative data were collected using a semi-structured interview form during face-to-face interviews with experimental group students after the 8 weeks implementation of SRS.

To control for the validity threats of the study, classroom observations were made by two independent observers by using a classroom observation form. Observations took part in both control groups and the experimental group for eight weeks.

2.2 Study Group

This study took place using a convenience sample from a high school located in the province of Sivas, Turkey. The research was carried out at the school where the first author worked. The study was carried out with three groups, one experimental and two control groups. The classes at the school were formed according to the average scores of the high school entrance exam in Turkey. Based on this criterion, three equivalent classes were selected. One of the classes was randomly assigned to the experiment group and the other two were randomly assigned as control groups.

A total of 83 K-12 students participated in the study; most of the students were age 14 (82%). In terms of gender distribution, about 55% of the students were male and 45% were female. All the participants took pre- and post-achievement tests and the questionnaires. From the experimental group, ten students volunteered for participating in the interview (five male and five female). Of these students, six were 14 years old and four were 15 years old (Table 1).

2.3 Data Collection Tools

2.3.1 Achievement Test

To investigate the effect of SRS on the students' achievement in an English course, an achievement test was developed. The national 9th grade English curriculum was examined, and a 52-item multiple-choice achievement test was prepared based on the objectives of the curriculum. The following objectives are examples:

- Students will be able to find specific information in a simple text about jobs/nationalities/countries,
- Students will be able to ask about and describe their neighborhoods,
- Students will be able to read a simple text for specific information about their neighborhoods/city, etc.,
- Students will be able to fill in a chart comparing cities in different countries/Turkey.

Table 1 Demographic information

	Control group 1 (questions in paper and pencil format)		Control group 2 (no questions)		Experiment group (questions in SRS)	
	f	%	*f*	%	*f*	%
Gender						
Male	15	53.6	16	59.3	12	42.9
Female	13	46.4	11	40.7	16	57.1
Age						
14	25	89.3	19	70.4	24	85.7
15	3	10.7	8	29.6	4	14.3
Total	28		27		28	

The achievement test was developed in four steps. Firstly, two or more questions were written for each objective. Secondly, the content validity of the test was examined by consulting three English teachers and two professors from the curriculum and instruction field. In the third step, the pilot testing was carried out with 80 students. The pilot administration of the test took about 60 min. The pilot study took place in different classes simultaneously in a single session to prevent interactions between the classes. In the fourth step, the data gathered from the pilot test were analyzed. To pick the best questions and to eliminate the problematic questions, the item difficulty index and the item discrimination power were calculated. Güler (2014) stated that the Henryson method should be used to perform item analysis in cases where the number of students is low (for example around 60 or 70). In this study, this method was used because the number of students participating in the pilot testing was 80. Microsoft Excel software was used to calculate the item difficulty index and the item discrimination power coefficients. The histograms for the distribution of the calculated item difficulty and item discrimination power scores are presented in Figs. 1 and 2.

As shown in Fig. 1 and Fig. 2, the difficulty of the test items and the item discrimination power showed a distribution that was close to normal. As a result of the test statistics, the achievement mean of the 52-item test was 60.53 and the standard deviation was 8.36, the reliability coefficient as calculated with KR 20 formula was 0.87, the test difficulty was $P = 0.61$ and the mean discrimination index was 0.37. Güler (2014) stated that, as a general criterion, items with a discrimination power of 0.19 and smaller should not be included in the test; between 0.20 and 0.29 could be included but after revision; and, 0.30 and higher could be put in the test directly. Considering these criteria, of all 52 items, 15 items were

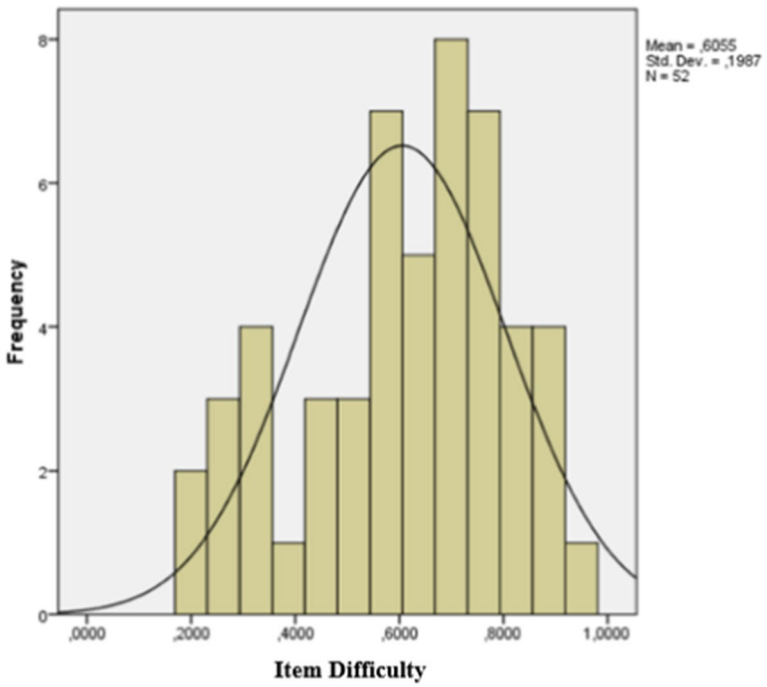

Fig. 1 Item difficulty histogram

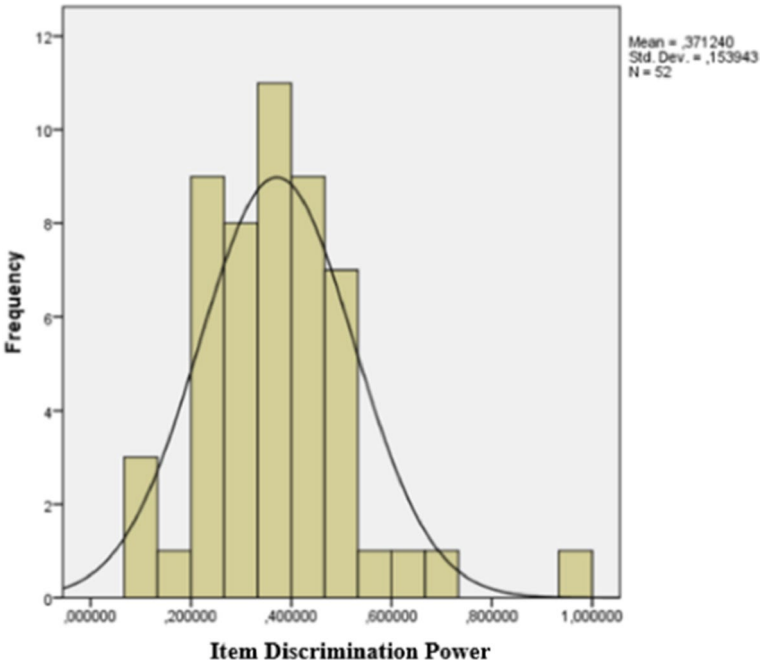

Fig. 2 Item discrimination power histogram

discarded in total, and a multiple-choice achievement test was prepared for 16 learning objectives (at least two questions for each objective) including 37 items. For the final form of the achievement test, the mean score was 22.79, with a standard deviation of 4.17, a reliability coefficient of KR 20 = 0.607, test difficulty $P = 0.62$, and a mean discriminability index of 0.25. The skewness value was 0.07 and the kurtosis was -0.64, indicating a close to normal distribution.

2.3.2 Achievement Emotions Questionnaire

To measure class and test achievement emotions of the students, the Achievement Emotions Questionnaire (AEQ) developed by Pekrun et al. (2005) was used. This questionnaire was adapted to Turkish by the researchers (Can et al., 2020). AEQ is a multidimensional self-report questionnaire designed to evaluate students' achievement emotions and consists of three sub-questionnaires: test, class, and learning-related emotions. In this study, the learning-related emotions questionnaire was not used as it is related to learning activities outside the classroom. Class-related emotions questionnaire consists of 80 items and measures 8 emotions: enjoyment, hope, pride, anger, anxiety, shame, hopelessness, and boredom. Test-related emotions questionnaire consists of 77 items and measures 8 emotions: enjoyment, hope, pride, anger, anxiety, shame, hopelessness, and relief. Each subquestionnaire measures the emotions in three different conditions: before, during, and after the achievement situation. To test the factorial structure of the test and class-related emotions scales, a confirmatory factor analysis with maximum likelihood estimation was used. The results of the Turkish adaptation of class-related and test-related emotions

questionnaire were as following: Model fit indices for test-related emotions were between "NC = 1.37–4.49, GFI 0.91, RMSEA = 0.02-0.10, IFI = 0.95–1.00, NFI = 0.93-0.99, NNFI = 0.93-0.99" and for the class related emotions "NC = 2.41–4.89, GFI = 0.89-0.97, AGFI = 0.82-0.94, CFI = 0.89-0.99, RMSEA = 0.06-0.11, IFI = 0.89-0.99, NFI = 0.86-0.98, NNFI = 0.89-0.99". The Cronbach's alpha reliability coefficient of the class-related questionnaire was 0.88, and the test-related emotions questionnaire was 0.89. These findings were acceptable since between 0.00 and 0.10 for RMSEA, between 0.90 and 1.00 for CFI, IFI, NFI, NNFI, GFI, between 0.85 and 1.00 for AGFI, and between 0 and 5 for NC generally accepted as good model fit (Bentler & Bonett, 1980; Çokluk et al., 2010; Jöreskog & Sörbom, 1993; Kline, 2011; Marsh & Balla, 1994; Şimşek, 2007; Tabachnick & Fidell, 2007; Wang & Wang, 2012; Yılmaz & Çelik, 2009).

2.3.3 Class Observation Form

An observation form was developed by the researchers to control for extraneous variables and validity threats that might affect the results. Developing the form, firstly the literature was examined, and a draft form was created. The face and content validity of the draft form were examined by two curriculum and instruction experts and two Turkish language and literature teachers. Items were edited based on these expert opinions. The draft form then was used in a pilot study in two classes, and the observation form was finalized based on the pilot. The final version of the class observation form involved the following sections: the physical environment of the class (number of students, seating order, heat, light), the social climate of the class (teacher-student interaction, student–student interaction, participation in the lecture, student questions, teacher questions, other), teaching methods and techniques used (at the beginning of the course, during the course and at the end of the course), evaluation methods used (at the beginning of the course, during the course, and at the end of the course), time management strategies used (at the beginning of the course, during the course and at the end of the course), and classroom management strategies used (at the beginning of the course, during the course and at the end of the course).

2.3.4 Semi-Structured Interview Form

In the study, face-to-face interviews were conducted using a semi-structured interview form to obtain students' views about using SRS in their classes. Based on the theoretical framework developed from a literature search, the first draft of the interview questions was prepared. First, three curriculum and instruction experts were consulted to gather evidence for face and content validity. In line with the feedback from the experts, the form was corrected accordingly, and it was submitted to the experts again; this process was repeated three times until a final agreement was reached on the questionnaire. Two Turkish language and literature teachers were consulted to determine the comprehensibility of the form; they concluded that there was no clarity problem. The draft form was applied to two students to strengthen the face validity of the form and to determine the time required for each question. There were no items that were not clear to the students. The final version of the semi-structured interview form consisted of six questions. The following questions are examples:

- Could you explain if there were any advantages to using Socrative (SRS) in your English class?

- Could you compare the English lessons you have taken this semester with the English lessons you took before?

2.4 Data Collection Process

One week before the experimental implementation, AEQ was administered to the experiment and control groups on the same day and at the same time. First, class-related AEQ was applied and half an hour later test-related AEQ was applied. These questionnaires were administered to the experimental and control groups again after 8 weeks of implementation.

To avoid student interactions between the classes, the first author administered the Achievement Test to the experimental and control groups simultaneously before and after the eight weeks of implementation during regular class hours. This process took 50 min.

The interviews were conducted after eight weeks of the experimental implementation to the volunteer students from the experimental group. The interview consent form was read by the researcher before the interview, and the students were asked to sign it. Then the voice recorder was turned on with the permission of the participant. Interviews were held on different days in the school library to prevent students from being influenced by each other and to allow them to express their views independently. The interview environment was comfortable and quiet. The interviews lasted approximately 15–20 min.

2.5 Data Analysis

2.5.1 Quantitative Data Analysis

In this study, the statistical significance of the within-subjects (time: pre-test and post-test) and between-subjects (group: experiment, control 1, control 2) effects and the interaction effects (time*group) were examined using a mixed ANOVA. To check the assumption of normality, skewness and kurtosis coefficients of pre-test and post-test scores were examined. For all dependent variables, the skewness coefficients ranged between − 0.957 and 2.104, and the kurtosis coefficients ranged between − 1.217 and 4.332. The distribution of data was assumed to be close to normal since the skewness values were within the limits of ± 3 and the kurtosis values were within the limits of ± 10 (Kline, 2016).

Box' M tests whether the covariances of the experimental and control groups were equal. If the equality was assumed, "Wilks' Lambda test, if not "Pillai's Trace" was used among multivariate tests" (Can, 2017, p.207). Three univariate tests were examined for the statistically significant main effects of within-subjects factor (time) and between-subject factors (group), and the interaction effect between within and between-subjects factors (time*group) on achievement and class-related and test-related achievement emotions. Post Hoc analysis was performed to examine the difference between the groups. Because three comparisons were made during the posthoc analysis (control 1 with the experimental, control 2 with the experimental, control 1 with control 2), the Bonferonni correction method was used. For this reason, in this study, the results of Post Hoc analysis were compared with an alpha value of 0.02. The hypothesis of equality of variances between groups was examined with the Levene test before Post Hoc analysis to select the test method. If the equality of the groups was ensured between the groups "Scheffe", if not "Dunnet C" analyses were used (Kayri, 2009).

2.5.2 Qualitative Data Analysis

Voice records gathered from the face-to-face interviews were carefully listened to twice and then the views of the ten students were transcribed without making any change. The data were then transferred into the MAXQDA 12 software. The data were analyzed using inductive content analysis. That is, the data were first grouped under the main themes and sub-themes and then codes were generated to conceptualize students' opinions reported during the interviews.

To enhance the trustworthiness of the results, the coding scheme was examined multiple times by two researchers. For each period, the themes and sub-themes were revised, and this process continued until these two researchers and the first author of this study reached a consensus. Finally, the findings were interpreted and reported. The coding scheme and examples of the direct quotations from students were presented in a table. To keep the identity information of the students confidential, nicknames of S1 through S10 were used to represent students.

3 Findings

3.1 The Effects of Using SRS on English Achievement

Table 2 presents the descriptive statistics for the Achievement test results for each group. The mean values of the post-test scores were higher than the pre-test scores for all three groups.

Before performing the mixed ANOVA analysis, the assumptions for performing the analysis were examined. Box's M test indicated that the covariances between the experimental and control groups were not equal, Box's M = 44.13, $F_{(6,\ 158206)} = 7.09$, $p < 0.05$. In this case, Pillai's Trace test was selected to continue with the analysis. As a result of Pillai's Trace test, the within-group factor—time (Pillai's Trace = 0.705, $p < 0.05$) and the interaction between the within-group and between-groups factor (time*group) were found to be statistically significant (Pillai's Trace = 0.497, $p < 0.05$). To test the equality of variance between groups, the Levene test was performed. The homogeneity of variances was ensured, Pre-test = $F_{(2,80)} = 2.596$, $p > 0.05$; Post-test = $F_{(2,80)} = 2.097$, $p > 0.05$. For this reason, the Scheffe test was preferred for Post Hoc analysis.

Between-subjects effects and within-subject effects on English achievement were examined. There were statistically significant differences between pre-test and post-test achievement scores, $F_{(1,\ 80)} = 190.991$, $p < 0.05$, $\eta p^2 = 0.705$, large effect. There was also a statistically significant difference between experimental and control groups, $F_{(2,\ 80)} = 12.463$, $p < 0.05$, $\eta p^2 = 0.238$, large effect. The interaction between time and group was statistically significant, $F_{(2,\ 80)} = 39.569$, $p < 0.05$, $\eta p^2 = 0.497$, large effect. Scheffe test revealed that

Table 2 Descriptive statistics for achievement in English

Time	Experiment group			Control group 1			Control group 2			Total		
	n	*M*	SD	*n*	*M*	SD	*n*	*M*	SD	*n*	*M*	SD
Pre-test	28	23.54	4.88	28	22.96	4.24	27	21.85	3.24	83	22.80	4.19
Post-test	28	31.54	2.61	28	25.25	3.75	27	24.15	3.52	83	27.01	4.61

the difference between the experimental group ($M_{posttest-pretest}$=8, SD=2.61) and the control group 1 ($M_{posttest-pretest}$=2.29, SD=3.75) and the control group 2 ($M_{posttest-pretest}$=2.3, SD=3.52) across time was statistically different. There was no statistically significant difference among the control groups (Table 3).

3.2 The Effect of Using SRS on Class Related Emotions

Tale 4 presents the descriptive statistics for the class-related emotions for each group. The mean values of the negative emotions such as shame, anger, boredom, hopelessness, and anxiety increased in control groups; and mean values for these emotions were decreased in the experimental group. As positive emotions, enjoy, pride and hope increased in the experimental group and these emotions were decreased in control groups (Table 4).

A mixed ANOVA was conducted to examine the effects of using SRS on the emotions of enjoyment, boredom, hope, hopelessness, anxiety, anger, pride, and shame. The results showed that using SRS had no statistically significant effect on the emotions of hope, hopelessness, anxiety, anger, pride, and shame in an English class, but there were statistically significant effects of using SRS on emotions of enjoyment and boredom.

3.2.1 Class Related Enjoyment Emotion:

Before performing the mixed ANOVA analysis, the assumptions for performing the analysis were examined. Box's M test indicated that covariances between the experimental and control groups were equal, Box's M = 12.89, $F_{(6,158206)}$ = 2.07, $p > 0.05$. In this case, Wilks' Lambda test was selected while continuing analysis. As a result of Wilks' Lambda test, within-subjects factor (time) was not found to be statistically significant (Wilks' Lambda = 0.998, $p > 0.05$); and, the interaction between the within-subjects and between-subjects factors (time*group) were statistically significant (Wilks' Lambda = 0.506, $p < 0.05$). To test the equality of variance between groups, the Levene test was performed and it was seen that equality was ensured, Pre-test = $F_{(2,80)}$ = 2.066, $p > 0.05$; Post-test = $F_{(2,80)}$ = 3.36, $p > 0.05$. For this reason, Scheffe was preferred for Post Hoc analysis.

Between-subject effects and within-subjects effects on class-related enjoyment emotion were examined. There was no statistically significant effect of time on class-related enjoyment emotion, $F_{(1,80)}$ = 0.146, $p > 0.05$. However, there was a statistically significant effect of group on class-related enjoyment emotion, $F_{(2,80)}$ = 4.360, $p < 0.05$, ηp^2 = 0.098, medium

Table 3 Mixed ANOVA results for achievement in English by time and group

Source	Sum of squares	Degrees of freedom	Mean square	F	ηp^2
Within subject effects					
Time	729.757	1	729.757	190.991*	.705
Group*time	302.376	2	151.188	39.569*	.497
Error	305. 672	80	3.821		
Between subject effects					
Group	619.172	2	309.586	12.463*	.238
Error	1987.286	80	24.841		

*$p < .05$

Table 4 Descriptive statistics results for class related emotions

Time	Experiment group			Control group 1			Control group 2			Sum		
	n	*M*	SD	*n*	*M*	SD	*N*	*M*	*SD*	*n*	*M*	SD
Enjoy												
Pre-test	28	2.86	1.04	28	3.32	.98	27	3.40	.68	83	3.19	.93
Post-test	28	4.03	.76	28	2.40	1.01	27	3.02	.67	83	3.16	1.06
Shame												
Pre-test	28	2.19	.95	28	2.08	.98	27	1.85	.95	83	2.04	.96
Post-test	28	1.83	.93	28	2.29	1.12	27	2.39	1.00	83	2.17	1.04
Pride												
Pre-test	28	3.04	1.06	28	3.69	1.11	27	3.72	.72	83	3.48	1.02
Post-test	28	3.61	.91	28	3.24	1.11	27	3.32	.68	83	3.39	1.92
Anger												
Pre-test	28	2.64	1.23	28	1.90	.83	27	1.75	.79	83	2.10	1.04
Post-test	28	1.30	.46	28	2.70	1.17	27	2.07	.93	83	2.02	1.06
Boredom												
Pre-test	28	3.35	1.14	28	2.77	1.18	27	2.23	1.04	83	2.79	1.2
Post-test	28	1.46	.66	28	3.68	1.08	27	2.56	.88	83	2.57	1.27
Hope												
Pre-test	28	3.27	1.00	28	3.82	.96	27	3.74	.81	83	3.61	.95
Post-test	28	3.82	.91	28	3.11	1.08	27	3.48	.70	83	3.47	.95
Hopelessness												
Pre-test	28	2.43	.96	28	1.71	.81	27	1.77	.73	83	1.97	.89
Post-test	28	1.50	.53	28	2.42	.95	27	1.98	.71	83	1.96	.84
Anxiety												
Pre-test	28	2.63	.83	28	2.20	.79	27	2.27	.73	83	2.37	.8
Post-test	28	1.88	.59	28	2.77	.73	27	2.35	.69	83	2.33	.76

effect. The interaction between time and group on class-related enjoyment was statistically significant, $F_{(2,80)} = 39.031$, $p < 0.05$, $\eta p^2 = 0.494$, large effect. Scheffe test showed a statistically significant difference between the experiment group ($M_{posttest-pretest}$= -0.1.17, $SD = 0.76$) and control group 1 ($M_{posttest-pretest}$= -0.92, $SD = 1.01$), and no statistically significant difference between the experimental group and control group 2 ($M_{posttest-pretest}$= -0.38, $SD = 0.67$) in terms of class-related enjoyment (Table 5).

3.2.2 Class Related Boredom Emotion

Before performing the mixed ANOVA analysis, the assumptions of the analysis were examined. Box's M test indicated that covariances between the experimental and control groups were equal, Box's M = 9.89, $F_{(6,158206)} = 1.59$, $p > 0.05$. In this case, Wilks' Lambda test was selected to continue analysis. As a result of Wilks' Lambda test, the interaction of within-subjects and between-subjects factors (time*group) were statistically significant (Wilks' Lambda = 0.454, $p < 0.05$) and the within-subjects factor (time) was not statistically significant, Wilks' Lambda = $p > 0.05$. Levene test showed that equality of variances

Table 5 Mixed ANOVA results for the class related enjoyment

Source	Sum of squares	Degrees of freedom	Mean square	*F*	ηp^2
Within subject effects					
Time	.062	1	.062	.146	.002
Group*time	32.980	2	16.490	39.031*	.494
Error	33.799	80	.422		
Between subject effects					
Group	9.695	2	4.847	4.360*	.098
Error	88.983	80	1.112		

*$p < .05$

was ensured for pre-test, $F_{(2,80)} = 0.503$, $p > 0.05$; but, not for the post-test, $F_{(2,80)} = 4.877$, $p < 0.05$.

Within-subject effects and between-subject effects on class boredom were examined. The main effect of the group was statistically significant, $F_{(2,80)} = 8.743$, $p < 0.05$, $\eta p^2 = 0.179$, large effect. The interaction between time and group on class-related boredom was statistically significant, $F_{(2,80)} = 48.041$, $\eta p^2 = 0.546$, large effect. There was no statistically significant main effect of time on class-related boredom scores, $F_{(1,80)} = 3.097$, $p > 0.05$.

As a result of Dunnet C analysis, there was a statistically significant difference between the experimental group ($M_{posttest-pretest}$= -1.89, $SD = 0.66$) and control group 1 ($M_{posttest-pretest}$= 0.91, SD = 1.08), and between control group 1($M_{posttest-pretest}$= 0.91, SD = 1.08) and control group 2 ($M_{posttest-pretest}$= 0.33, $SD = 0.88$). There was no statistically significant difference between the experiment group and control group 2 ($M_{posttest-pretest}$= 0.33, $SD = 0.88$) (Table 6).

3.3 The Effect of Using SRS on English Test Related Emotions

Table 7 presents the descriptive statistics for the test-related emotions for each group. The results indicated that using SRS had statistically significant effects on test-related emotions of anxiety and relief. The descriptive statistics showed that there was an increase in the

Table 6 Mixed ANOVA results for class related boredom

Source	Sum of squares	Degrees of freedom	Mean square	*F*	ηp^2
Within subject effects					
Time	1.971	1	1.971	3.097	0.037
Group*time	61.162	2	30.581	48.041*	0.546
Error	50.924	80	0.637		
Between subject effects					
Group	25.193	2	12.596	8.743*	0.179
Error	115.253	80	1.441		

*$p < .05$

Table 7 Descriptive statistics results of test related emotions of experimental and control groups

Time	Experiment group			Control group 1			Control group 2			Sum		
	n	*M*	SD	*n*	*M*	SD	*n*	*M*	SD	*n*	*M*	SD
Anxiety												
Pre-test	28	3.29	.88	28	3.25	.94	27	3.08	.8	83	3.21	.87
Post-test	28	1.80	.74	28	3.46	1.01	27	3.13	.82	83	2.79	1.12
Relief												
Pre-test	28	3.61	1.08	28	4.00	.86	27	3.85	.83	83	3.82	.93
Post-test	28	3.14	1.00	28	4.07	.93	27	3.19	.94	83	3.47	1.04
Pride												
Pre-test	28	2.75	.67	28	3.07	.96	27	2.91	.84	83	2.91	.83
Post-test	28	3.39	.83	28	3.16	.98	27	2.84	.88	83	3.13	.92
Enjoy												
Pre-test	28	2.46	.59	28	2.79	.71	27	2.83	.77	83	2.69	.71
Post-test	28	3.52	.7	28	2.60	.74	27	2.70	.85	83	2.94	.86
Anger												
Pre-test	28	3.01	.86	28	2.69	1.00	27	2.54	.99	83	2.75	.96
Post-test	28	1.52	.48	28	2.85	.89	27	2.28	.94	83	2.22	.96
Hope												
Pre-test	28	3.08	.66	28	3.35	.67	27	3.33	.73	83	3.25	.69
Post-test	28	3.48	.7	28	3.18	.7	27	3.17	.65	83	3.28	.69
Hopelessness												
Pre-test	28	2.51	.79	28	1.95	.75	27	2.08	.78	83	2.18	.8
Post-test	28	1.51	.64	28	2.14	.87	27	2.07	.88	83	1.94	.85
Shame												
Pre-test	28	2.41	.89	28	2.42	.93	27	2.30	.84	83	2.38	.88
Post-test	28	1.76	.77	28	2.34	1.00	27	2.19	.83	83	2.09	.9

experimental group compared to the control groups in terms of all test-related emotions (Table 7).

3.3.1 English Test Anxiety

Before performing the mixed ANOVA analysis, the assumptions for performing analysis were examined. Box's M test indicated that covariances between the experimental and control groups were not equal, Box's M = 16.15, $F_{(6,158206)} = 2.60$, $p < 0.05$. In this case, Pillai's Trace test was selected to continue analysis. As a result of Pillai's Trace test, the within-subjects factor (time) was statistically significant, Pillai's Trace = 0.202, $p < 0.05$. The interactions of within-subjects and between-subjects factors (time*group) were statistically significant, Pillai's Trace = 0.471, $p < 0.05$. In order to test the equality of variance between groups, Levene test was performed and it was seen that equality was ensured, Pre-test = $F_{(2,80)} = 0.607$, $p > 0.05$; Post-test = $F_{(2,80)} = 1.533$, $p > 0.05$. For this reason, Scheffe was preferred for Post Hoc analysis.

The main effect of time on test-related anxiety was statistically significant, $F_{(1,80)} = 20.293$, $p < 0.05$, $\eta p^2 = 0.202$, large effect. The main effect of the group on

test-related anxiety was also statistically significant $F_{(2,80)}=8.070$, $p<0.05$, $\eta p^2=0.168$, large effect. The interaction between time and group on test-related anxiety was statistically significant, $F_{(2,80)}=35.583$, $p<0.05$, $\eta p^2=0.47$, large effect.

As a result of the Scheffe analysis, there was a significant difference between the experiment group ($M_{posttest-pretest}$= -1.49, $SD=0.74$) and control group 1 ($M_{posttest-pretest}$= -0.21, $SD=1.01$) and between experiment group and control group 2 ($M_{sontest-öntest}$= -0.05, SS = 0.82). (Table 8).

3.3.2 English Test Relief

Before performing the mixed ANOVA analysis, the assumptions for performing the analysis were examined. Box's M test indicated that the covariances between the experimental and control groups were equal, Box's M = 5.87, $F_{(6,158206)}=0.94$, $p>0.05$. In this case, Wilks' Lambda test was selected to continue analysis. As a result of Wilks' Lambda test, interactions of within-subjects and between-subjects factors (time*group) were statistically significant, Wilks' Lambda = 0.91, $p<0.05$. Levene test showed that homogeneity of variance was assumed, Pre-test = $F_{(2,80)}=1.023$, $p>0.05$; Post-test = $F_{(2,80)}=0.077$, $p>0.05$. For this reason, Scheffe was preferred for Post Hoc analysis.

Between-subjects and within-subject effects on test-related relief were examined. There was a statistically significant effect of time, $F_{(1,80)}=7.748$, $p<0.05$, $\eta p^2=0.088$, medium effect. Also, there was a statistically significant effect of group on test-related relief, $F_{(2,80)}=5.954$, $p<0.05$, $\eta p^2=0.13$, medium effect. The interaction between time and group was statistically significant, $F_{(2,80)}=2.992$, $p<0.05$, $\eta p^2=0.07$, medium effect.

Scheffe analysis indicated that there was a statistically significant difference between the experimental group ($M_{posttest-pretest}$ =-0.47, $SD=1.00$) and the control 1 ($M_{posttest-pretest}$= 0.07, $SD=0.93$), but there was no statistically significant difference between the experimental group and the control group 2 ($M_{posttest-pretest}$= -0.66, $SD=0.94$) (Table 9).

3.4 Students' Positive Views on SRS

When students were asked about using SRS in their English courses, most of the students provided positive views. From these views, three themes have emerged: attitudes, learning, and classroom atmosphere. In terms of students' attitudes, most of the students stated that

Table 8 Mixed ANOVA results for test related anxiety

Source	Sum of squares	Degree of freedom	Mean square	*F*	ηp^2
Within subject effects					
Time	6.978	1	6.978	20.293*	0.202
Group*time	24.472	2	12.236	35.583*	0.471
Error	27.510	80	0.344		
Between subject effects					
Group	19.233	2	9.617	8.070*	0.168
Error	95.330	80	1.192		

*$p<.05$

Table 9 Mixed ANOVA results for test related relief

Source	Sum of squares	Degree of freedom	Mean square	F	ηp^2
Within subject effects					
Time	5.090	1	5.090	7.748*	0.088
Group*time	3.931	2	1.965	2.992*	0.070
Error	52.550	80	0.657		
Between subject effects					
Group	13.546	2	6.773	5.954*	0.130
Error	91.007	80	1.138		

*$p < .05$

the lessons were fun with SRS and using SRS was easy. They said that it was enjoyable to study with SRS and they wanted to see it more in their learning environment.

Regarding learning English, students stated that they understood and remembered the lesson better. One student stated that thanks to SRS, they had an opportunity to use different words in the lesson and they had a chance to study differently. Most of the students stated that the system helped them to recognize their English performance and thus allowed them to make a self-assessment. In addition to these, students stated that the system increased their attention, and their course experience was productive. Besides this, they pointed out that SRS helped them to remember better what they had learned. In sum, as specific learning outcomes, SRS was seen as helpful for learning new words in English, learning about students' self-progress in English, and helpful for learning English in general.

In terms of the classroom environment, students stated that their classroom turned into a friendly atmosphere. Students also stated that teenagers generally love technology and so their participation in the course and the interaction in class increased. According to them, a friendly rivalry was created thanks to SRS and this contributed to the positive interactions among them. They also stated that because everybody tried to do his/her best, they focussed on studying. In addition to these, students pointed out that using a different learning tool lets them study in an enjoyable learning environment (Table 10).

3.5 Students' Negative Views on SRS

When the participants were asked about the disadvantages of SRS, half of the students stated that there was no disadvantage of the system. the negative responses were directed to the technological infrastructure of the school and SRS content. Most of the students mentioned the problems they had in connecting to the system due to insufficient internet infrastructure. They also stated that this problem sometimes caused a waste of time. Besides this, some of the students expressed that they had no smartphone or tablet and that made them impossible to use Socrative. (Table 11).

3.6 Student Suggestions for SRS to be More Efficient

During the interview, about improving the system, students generally talked about the use and content of the SRS. Most of the students stated that it would be better to make the system available offline without the need for internet access, and so there would be no waste

Table 10 Students' positive views on using SRS in an English class

Sub-themes	Codes	Quotations
Attitudes	Fun	S5 "Lessons were really fun compared to the other lessons. Lessons with Socrative were enjoyable. I wish we could do more."
		S4″ Lessons with Socrative are more enjoyable."
		S5 "Comparing to the other lessons, our lessons were really funny. I wish we could study more."
	Easiness	S2 "It is easy to use it. We can easily learn how to use it."
Learning	Productivity	S5 "Our classes were generally productive because we benefited from more technology and communicated much."
		S4 "Lessons were generally fruitful because we benefited from more technology and we communicated more."
		S2 "With the help of questions asked with Socrative, we understood the lesson better and realized that we did."
		S7 "We have learned many new words with Socrative."
	Retention	S1 "… We revised what we had learned, and this made it easier for us to remember."
	Self-assessment	S2 "We could see our mistakes when seeing the results after the SRS."
		S4 "After the lessons, we solve the questions about the subject we are dealing with and thus we fully understand the subject. We immediately saw the questions that we cannot do and so we could ask you and learn them. We corrected our mistakes."

Table 10 (continued)

Sub-themes	Codes	Quotations
Classroom atmosphere	Friendly environment	S5 "Our lessons were in a friendly environment
		S8 "We use technology to study. As young people like to use technology, our participation in the class is increasing. It increases our learning. We remember more easily what we learned. A pleasant atmosphere is created in a racing mood."
		S9 "…as young people, we are a little bit fond of technology and this is exactly what it is for us. We participate more effectively with other friends …"
		S4 "We're even more interested in the class. It is a pleasant environment."
		S6 "Everybody's trying to prove he's better. That's why everyone focuses on studying and this is funny."
	Interaction	S2 "Our interactions increased. It enables us to speak in English more."
		S1 "This year is definitely better in terms of interaction. We speak English in classes. The interaction between the teacher and our friends is better. Our teacher is more friendly than last year's. We also increase our interaction by speaking English in the lessons. Using the Socrative software in the lessons also increased the interaction between us. It created a warmer environment."
	Diversity	S2 "It was a different event. The change was good."
		S6 "Socrative enabled us to study in a different way and so the course was more enjoyable."

Codes under themes are ranked from top to bottom according to their frequencies

Table 11 Students' negative views on SRS

Subtheme	Codes	Quotations
Infrastructure	Internet infrastructure	S3 „We entered the system, but we had to enter again when the internet connection was cut. Sometimes our friends didn't have internet. The school's internet was sometimes weak. There were problems like this from time to time."
	Lack of hardware	S2 "If there is a disadvantage, for example, sometimes everyone may not have a tablet or phone, then we cannot do Socrative. I borrowed your smartphone for example."
	Time-consuming	S1 „Because of problems of infrastructure, it was sometimes a waste of time. It would be better if it was done without an internet connection."

Codes under themes are ranked from top to bottom according to their frequencies

of time. Some students said that there were only a few questions asked on SRS and the scope of the questions should be expanded One student suggested there should be a user guide. Despite these, three students said that the system was good in this way and that no change was needed (Table 12).

3.7 Use of SRS in Courses Except for English

When the students participating in the research were asked about their opinions about the use of SRS in other courses, half of the students reported positive opinions and the other half reported negative opinions. Some of the students who stated negative opinions stated that it may be difficult to use in Math courses and some students stated that it is not necessary to use it in another course. In addition to these, some students expressed positive opinions and stated that it can be used in social sciences. Some students have stated that it is appropriate to use it in other courses because it makes the lesson enjoyable (Table 13).

4 Discussion

The present study showed that SRS helped students to get higher achievement scores in an English course. Many studies have consistent findings that SRS have an impact on increasing academic achievement (i.e., Addison et al., 2009; Agbatogun, 2013; Awedh et al., 2015; Barrett et al., 2005; Buil et al., 2016; Caldwell, 2007; Cardoso, 2011; Coca, 2013; Crouch & Mazur, 2001; Çelik, 2015; Laxman, 2011; Morgan, 2008; Thoms & Williams, 2010). How SRS is helping students to increase their achievement is also examined in these studies. For example, SRS plays an encouraging role in the active participation of the students by helping them to concentrate on the subject matter (Connor, 2009; Cutrim, 2008; Lee, 2000). SRS is also found to be effective in increasing students' attention and student motivation, and on creating a student-centred classroom environment (Addison et al., 2009; Aslan & Şeker, 2017; Buil et al., 2016; Cardoso, 2011; Coca, 2013; Connor, 2009; Jain & Farley, 2012; Kay & LeSage, 2009; Kaya & Balta, 2016; Mork, 2014; Presby & Zakheim, 2006; Svetanant & Nakazawa, 2014; Yıldırım & Kahraman, 2012). Besides, SRS helps to create a competitive and pleasant environment in the classroom and enables students to see their mistakes immediately, and allows correcting them (Barrett et al., 2005; Cardoso, 2011; Crouch & Mazur, 2001; DeBourg, 2008; Kay & LeSage, 2009; Mork, 2014; Stowell et al., 2007). The present study also showed that SRS is effective in decreasing test anxiety. So, one of the factors that increase the achievement of the students may be their low-test anxiety. There are many studies investigating the relationship between test anxiety and achievement and these studies show that too much test anxiety is negatively correlated with achievement (Amiri & Ghonsooly, 2015; Aşıksoy & Sorakin, 2018; Hadfield & Maddux, 1988; Horwitz, 2010; Young, 1986) Besides, positive emotions have positive effects on students' achievement compared to students with negative induced emotions (Ifenthaler, 2015). The pleasant environment may induce positive emotions of students and these positive emotions may be effective on explaining their achievement.

Immediate feedback is an important factor for learning (i.e., Dihoff et al., 2004; Golonka et al., 2014; Peters, 2015; Titova & Talmo, 2014; Tomasello & Herron, 1989). Students see what they could or could not learn through self-assessment, and so they can see their shortcomings and learn better (Presby & Zakheim, 2006). Immediate feedback enhances the performance on the examination and promotes the retention of information learned in a

Table 12 Student suggestions for SRS

Subthemes	Codes	Quotations
Usage	Be able to use without internet access	S2 "It's better to use Socrative without the need for internet because it's faster."
	Be able to use from home	S5 "… We should also be able to do it at home. Not just in class. We'd better use it without the Internet."
No change	It should stay that way	S2. "I think it's fine this way."
Content	More questions	S5 "…In addition, students should be asked more questions, more Socrative should be used."
	Scope of questions	S1 "The scope of questions should be further developed."
	User guide	S5 "I think you need to have the user manual first."

Codes under themes are ranked from top to bottom according to their frequencies

Table 13 Student opinions on the use of SRS in other courses

Subthemes	Codes	Quotations
Positive	Maybe because it is enjoyable	S6 "Maybe. At least we study in a different way. It could be more enjoyable to study rather than on paper."
	Maybe for social sciences	S5 "I don't want it for Math but maybe for verbal classes." S9 "It may be good for verbal classes."
Negative	Not necessary except for English	S1 "I think it is not sensible to use it in other lessons. Not necessary except for English."
	Not useful for maths	S4 "I don't think it could be used for Math."

Codes under themes are ranked from top to bottom according to their frequencies

course (Dihoff et al., 2004). Mobile devices can enhance learning and teaching by providing immediate feedback and provide a good diagnosis of learning problems and so they may enhance learner autonomy (Titova & Talmo, 2014). In this study, students who were participated in interviews stated that SRS provided them opportunities for self-assessment, peer-assessment, and for correcting their mistakes. Many studies revealed that SRS provides instant feedback about student comprehension and progress; and therefore, promotes learning (i.e., Crews et al., 2011; Mork, 2014).

In the current study, using questions and immediate feedback with SRS and in a paper-and-pencil format helped increasing students' class-related enjoyment and test relief, and decreasing students' class-related boredom. Because there was a significant decrease in the experimental group compared to the control group 1 (no questions asked) but no difference was observed between the experimental group and control group 2 (questions were asked on paper). We believe that these findings might be a sign of the effect of using questions/exercises and providing immediate feedback, no matter if the technology was used, on students' test relief, and class-related boredom and enjoyment emotions. The results obtained from the interviews also showed that students had positive experiences with SRS. They pointed out that SRS applications were pleasant, fun, efficient, and easy to use. Students also stated that SRS created a friendly classroom climate and they felt comfortable and relaxed during the lessons. Similarly, in their study, Yıldırım and Kahraman (2012) also stated that students generally have positive ideas about using SRS.

In the present study, there were no significant differences between the experimental and control group students' class-related achievement emotions of shame, pride, anger, hope, hopelessness, and anxiety. However, when the changes in the scores of these emotions were examined using descriptive statistics, it was observed that there was a positive change in the experimental group's mean scores compared to the other groups. Therefore, the statistically non-significant result might derive from the low sample size, and/or the mean differences were not high enough to indicate a statistical significance. Besides, although quantitative findings revealed that the class-related anxiety did not decrease significantly in the experiment group compared to control groups, the qualitative findings showed that students felt relaxed and felt that they were in a warm classroom climate through SRS. The previous research also shows that SRS helps students to reduce their anxiety during the lesson and so, allows them to study without getting bored and lead them to be active (Ismail, 2015; McDonough & Foote, 2015; Svetanant & Nakazawa, 2014; Yu et al., 2014). The usage of SRS in foreign language courses decreases the foreign language anxiety of students and therefore using SRS in foreign language teaching has positive effects (Svetanant & Nakazawa, 2014; Yu et al., 2014). The reason for this situation is that the wrong answer of students cannot be seen by other students and only the teacher can see them. The teacher does not tell who is right or wrong and, so students can answer the questions freely in a comfortable environment. Thus, anxiety, the feelings of humiliation, shame, anger, or fear when students make a mistake are reduced (Ohashi, 2015; Svetanant & Nakazawa, 2014; Yu et al., 2014).

The qualitative findings revealed that the interaction between students and teachers in the classroom increased thanks to SRS. Consistent with the previous studies, using SRS initiated the interaction between student–teacher and student–student, increased the quality of interaction as being an effective interaction media in this process (Agbatogun, 2013; Aslan & Şeker, 2017; Barrett et al., 2005; Blasco-Arcas et al., 2013; Caldwell, 2007; Cardoso, 2011; DeBourg, 2008; Gök, 2011; Kay & LeSage, 2009; Yıldırım & Kahraman, 2012). For example, Addison, Wright, and Miller (2009) stated that even the students who had low academic achievement had positive ideas about SRS. Also,

he stated that students' attitudes toward the lesson changed positively thanks to SRS. In addition to this, it was stated that the teacher had an opportunity to understand the students better as a result of increased interaction, and thanks to this interaction, the lessons took place in a more positive environment (Barrett et al., 2005; Cutrim, 2008; Svetanant & Nakazawa, 2014). In the current study, students stated that they love technology, they stated that they were more interested in the courses with technological tools and therefore they followed the course willingly. In the literature, both students and teachers have positive opinions about the use of information and communication technologies in the course (Ahmad, 2012; Aydin, 2013; Baz, 2016; Yükselir, 2016). Using technology is enjoyable for students and so this may be effective on their learning outcomes. The findings of the study indicated that technology is effective on their both positive emotions and their academic success.

According to Pekrun and Stephens (2010) when people feel that an event is worth and important, and it is in their control they may feel joy, hope, and pride. According to the control value theory these are anticipatory activating emotions and emotions are an important factor to anticipate students' success. Findings of this study revealed that the achievement emotions student felt during the course are generally positive. From a control-value perspective, it could be understood that SRS has a positive effect on both students' achievement and achievement emotions.

Our qualitative findings also showed that SRS may have some limitations. For example, it may be time-consuming because of the problems in internet infrastructure. For this problem, students offered offline devices may be used to prevent waste of time. Likewise, Antis (2011) stated that SRS takes more time than doing exercises with paper and pencil; and therefore, this system may cause time loss. Aljaloud, Gromik, Billingsley, and Kwan (2015) also point out the time issue as a limitation of SRS. Lowery (2005) stated that there are two types of SRS and one of them is student input devices and the other type is web-based devices. Students input devices are generally infrared or radio frequency keypads and these devices do not need internet. These devices are mostly called "Clicker" and these are portable devices and look like tv remote control and use radio-frequency or infrared technology to transmit and record student responses to questions presented in the classroom (Buil et al., 2016). So to abstain from time loss caused by the internet, these devices may be used. Previous studies which used clicker as SRS generally have not reported time lost because of technical problems (i.e. Penuel et al., 2007; Rodriguez & Shepard, 2013; Trees & Jackson, 2007).

In terms of using SRS in English classes many studies focus on positive sides such as increased interaction (Cutrim, 2008; Svetanant & Nakazawa, 2014; Yu et al., 2014), active participation (Cutrim, 2008), motivation (Cardoso, 2011; Kaya & Balta, 2016; Svetanant & Nakazawa, 2014), decreasing anxiety and stress level (Svetanant & Nakazawa, 2014; Yu et al., 2014), assessing students, friendly and competitive environment (Agbatogun, 2013; Balta & Tzafilkou, 2019; Caldwell, 2007; Cardoso, 2011; Çelik, 2015; Khan & Khan, 2019; McDonough & Foote, 2015; Mork, 2014; Oigara & Keengwe, 2013) and achievement (i.e., Addison et al., 2009; Agbatogun, 2013; Awedh et al., 2015; Barrett et al., 2005; Buil et al., 2016; Caldwell, 2007; Cardoso, 2011; Coca, 2013; Crouch & Mazur, 2001; Çelik, 2015; Laxman, 2011; Morgan, 2008; Thoms & Williams, 2010). But achievement emotions related to EFL class and tests such as boredom, anger, pride, hopelessness, etc. haven't been encountered in literature. For this reason, this study is important in terms of handling students' various emotions about English courses and tests.

5 Conclusion

In this study, the use of SRS increased students' achievement and decreased students' test anxiety in a 9th grade English course, since there were statistically significant differences between the SRS used experimental group students and the control groups. However, class-related enjoyment, class-related boredom, and test relief emotions were not statistically different in the experimental group and the control group 2, indicating that students enjoyed the lessons more, felt less bored, and felt more relived during the tests when they were asked questions and provided immediate feedback in the lessons. SRS did not have a statistically significant effect on some class-related achievement emotions: anxiety, shame, pride, anger, boredom, hopelessness; and on some test-related achievement emotions: pride, enjoy, anger, hope, hopelessness, and shame.

Interview results showed that students stated that SRS enabled them to have fun and relax classroom climate and this helped them to enjoy the course. In addition to this, students stated that thanks to SRS, they could have a chance to make a self-assessment, saw their mistakes, and corrected them. They also stated that they had learned better with SRS and actively participated in the lessons with SRS. During the interviews, students also pointed out that sometimes SRS might have caused a waste of time because of inefficient internet infrastructure. Besides this, some technical problems they had during the implementation occasionally interrupted their study. So, they stated that these problems may be prevented using SRS that needs no internet and it would be more efficient.

In this study, the effects of using SRS on the students' test-related achievement emotions and class-related achievement emotions were examined and their opinions were gotten about SRS, but the effects of using SRS on learning-related emotions were not examined as SRS was used in a classroom context. Further research that investigates the role of using SRS on learning-related achievement emotions is needed. Besides, further studies might use different SRS software and compare them.

According to Davis (1989) perceived usefulness and perceived ease of use are some indicators that can be taken into account to use or not the given technological tool. The results of the study show that it is easy to use the SRS (Socrative) and it was regarded as enjoyable by students. Also, SRS was effective in terms of students' academic achievement and decreasing negative achievement emotions. So, in terms of perceived usefulness and perceived ease of use, Socrative can be used in classroom settings to make the classroom environment enjoyable and increase students' achievement.

In this study, although it was revealed that using SRS has positive effects on student academic achievement and their achievement emotions there are some limitations of this study. Firstly, this study was conducted with high school students in English lessons and so is limited to only the English study domain and high school. Besides this study was carried out for eight weeks and so limited by this period. This study is also limited to the test questions applied to students in the experimental and control groups.

In the current study, using SRS and using questions on paper, and providing immediate feedback to the questions had a positive impact on students' class-related boredom, class-related enjoyment, and test relief in an English course. As a practical implication, we suggest teachers use exercises that students actively get involved in to decrease students' boredom and increase their enjoyment and test relief emotions. Also, we suggest teachers use offline devices such as clickers to save time. Besides this, a teacher may test the system before the lesson to see the potential problems. The teacher may also have a pilot lesson to show students how the system works.

Appendix

Appendix 1: The distribution of academic achievement scores by time and group variables

See Fig. 3

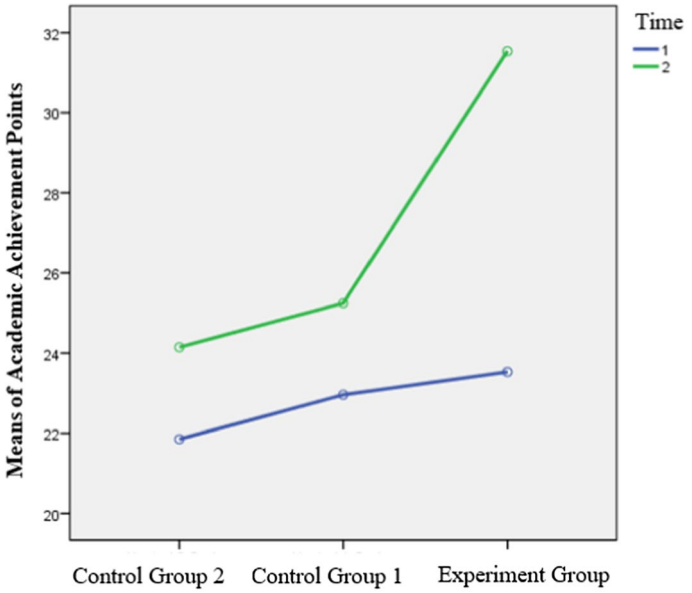

Fig. 3 The distribution of academic achievement scores by time and group variables

Appendix 2: The distribution of class related enjoyment, boredom, hope, hopelessness, anxiety, anger, pride and embarrassment emotions by time and group variables

See Fig. 4.

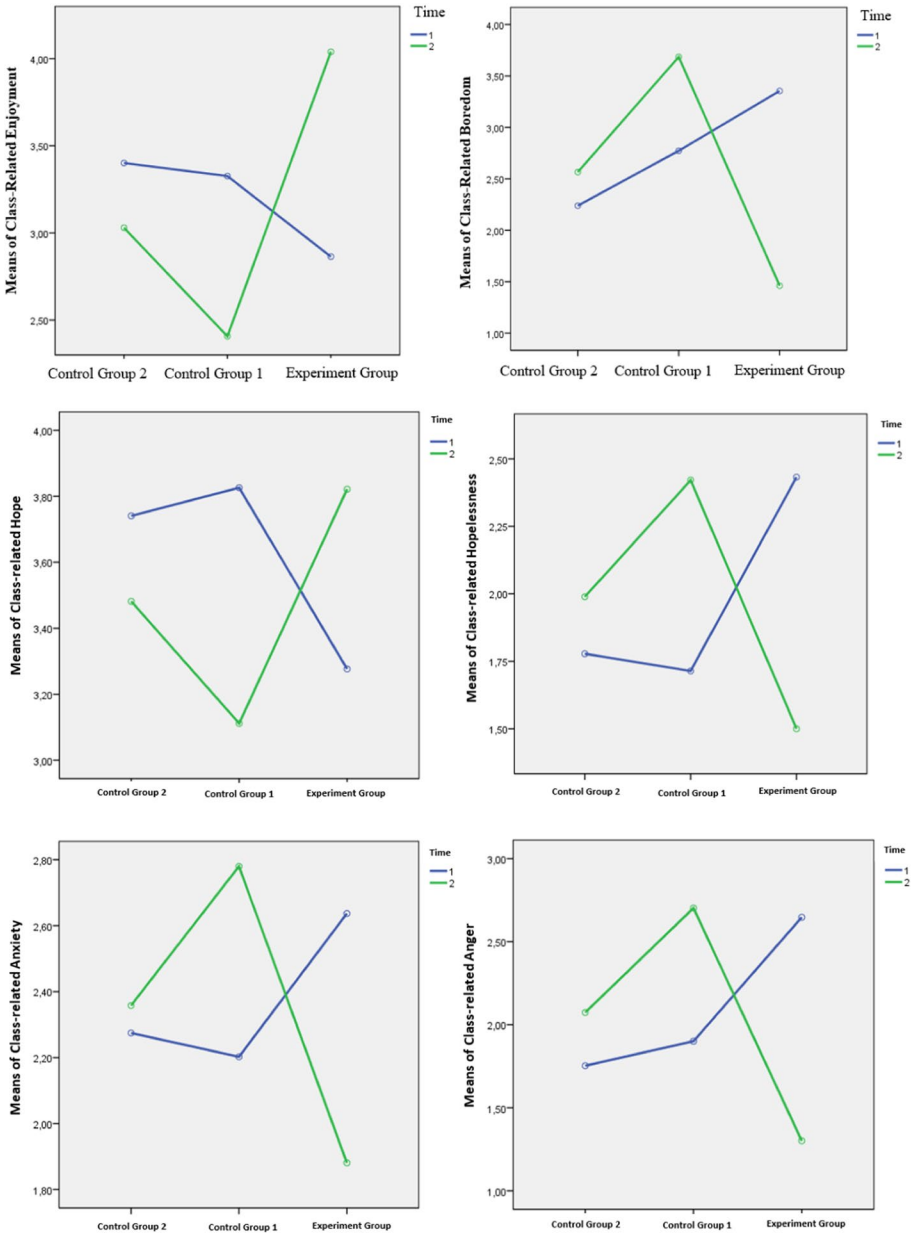

Fig. 4 The distribution of class related enjoyment, boredom, hope, hopeless, anxiety, anger, pride and embarrassment emotions by time and group variables

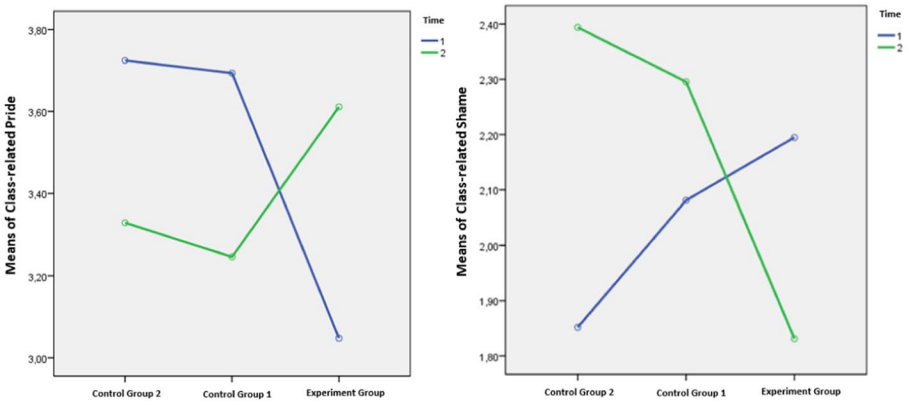

Fig. 4 (continued)

Appendix 3: The distribution of test related anxiety, relief, pride, enjoyment, anger, hope, hopelessness, and shame emotions by time and group variables

See Fig. 5.

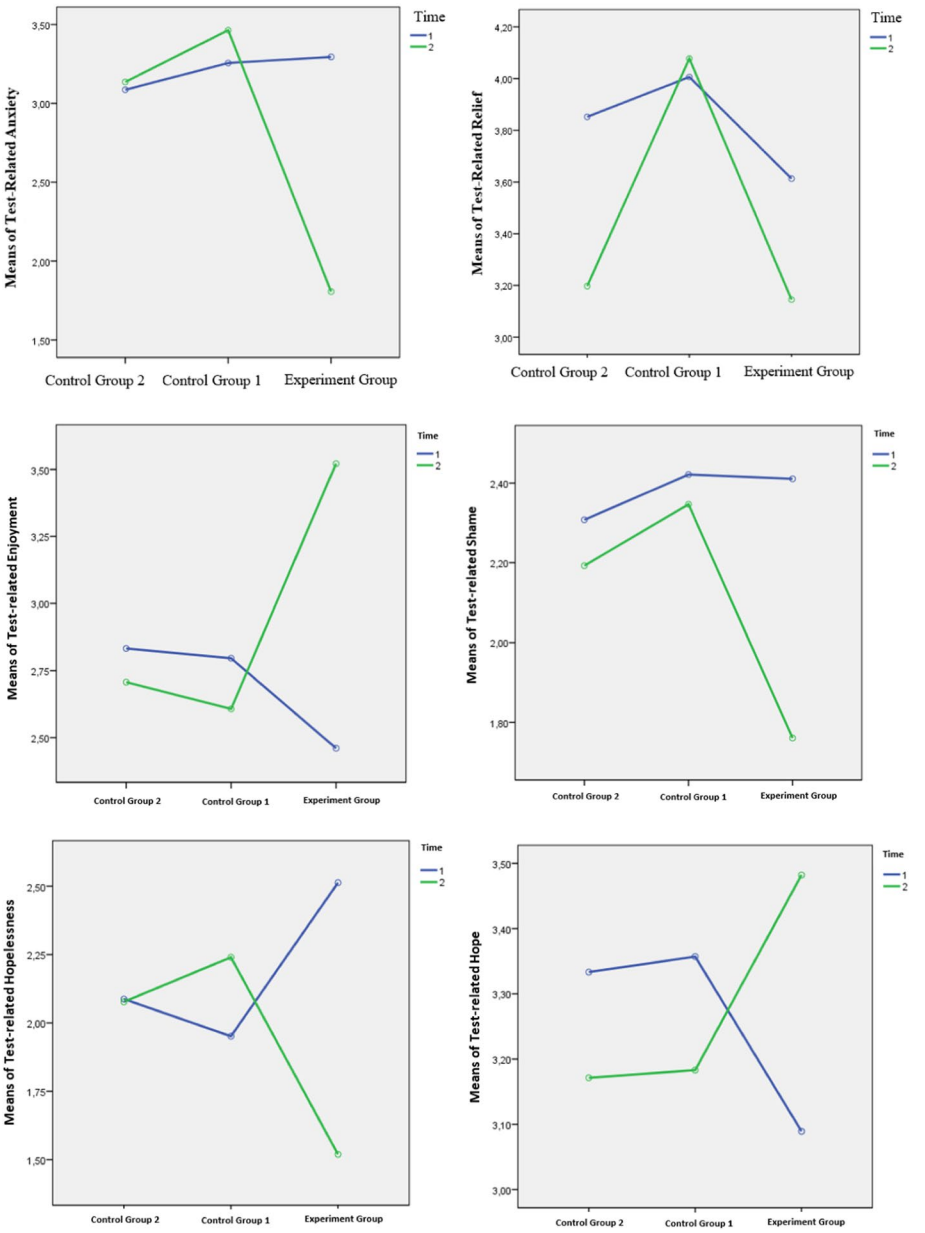

Fig. 5 The distribution of test related anxiety, relief, pride, enjoyment, anger, hope, hopeless, and shame emotions by time and group variables

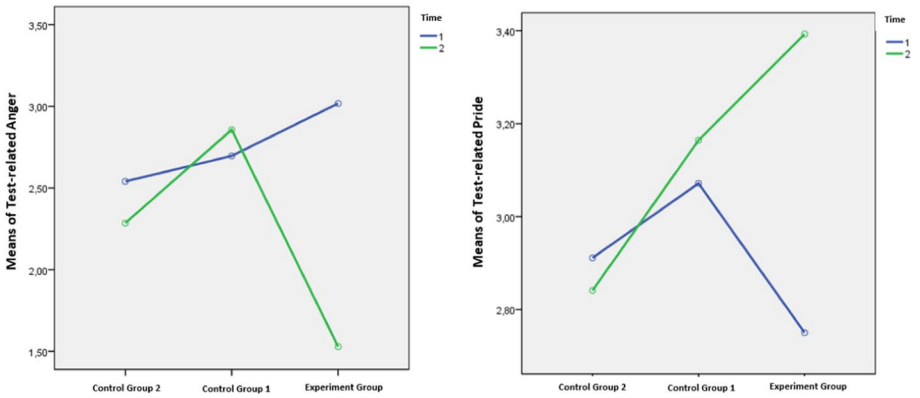

Fig. 5 (continued)

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