

## An investigation into pre-service teachers' online learning climate perceptions

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### Abstract

Starting from the first half of 2020, educational institutions at all levels have had to switch to online education as an emergency solution for the global outbreak of Covid-19 pandemic. However, it would hardly be justified to argue that teachers and students were well-prepared for such a swift change. Accordingly, this transformation has resulted in many difficulties for teachers and students along with educational institutions. One of the primary challenges teachers have experienced throughout the process is creating a positive online classroom climate. Thus, the main purpose of the present study is to reveal the online learning climate perceptions of pre-service teachers by adapting and using the Online Learning Climate Scale (OLCS) in Turkish context. In a similar vein, such variables as gender, department or grade level, which may have an influence on the perceptions of pre-service teachers, are also aimed to be disclosed within the study. The research has been conducted with a study group of 348 pre-service teachers. It has been observed that the pre-service teachers' perceptions on online learning climate are at less than moderate level; therefore, far from satisfactory. Additionally, it has been noted that variables such as the department, grade level and level of digital literacy have an influence on the OLCS perceptions of the pre-service teachers. Finally, the overall results of the study suggest that the skill of creating a positive online learning climate needs to be improved for pre-service teachers via integrating courses into the curriculum of teacher training institutions and organizing subject-specific trainings.

## 1. Introduction

The continuous transformation caused by the Covid-19 pandemic can be observed in almost every field and sector globally and the field of education is no exception. In an effort to minimize people's mobility and contact, many countries have stopped traditional face-to-face education and adopted online education. As a result, online education is getting more and more widespread in tertiary education as well as primary and secondary education (Allen & Seaman, 2003; Devran & Elitaş, 2016; Gürer et al., 2016; Kaban & Çakmak, 2016; Kaufmann et al., 2016; Kavrat & Türel, 2013). In fact, this transformation was not completely unexpected because Boettcher and Conrad (2016) have projected that traditional face-to-face courses will be replaced by courses that employ digital communication tools via the internet. Consequently, many higher education institutions, partly in an effort to internationalize, had already commenced the process of digitalization within their operations in the form of hybrid and blended courses besides traditional face-to-face education. Such switch to online education implies that teachers are

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expected to take on new instructional roles and responsibilities in online education, one of which is constructing a positive online classroom climate. Although the construct of classroom climate has been studied extensively in traditional face-to-face educational settings, it would be hardly justified to argue the same for online contexts (Kaufmann et al., 2016) despite its tremendous influence on learners' level of achievement and on their satisfaction with the experience (Barksdale et al., 2021; Barr, 2016; Djigić & Stojiljković, 2011; Dwyer et al., 2004; Gezer & Şahin, 2017; Ghaith, 2003; Johnson, 2006; López et al., 2018; Marraccini et al., 2020; Shewark et al., 2018; van der Sijde & Tomic, 1992). In line with this, the following section of the study deals with the construct of classroom climate in online education.

## 2. Literature Review

### 2.1. Classroom Climate

The construct of classroom climate is closely associated with classroom management, which succinctly refers to "...creating safe and stimulating learning environment" (Djigić & Stojiljković, 2011, p. 820), covering components such as management of time, space, labor, materials, activities, behavior of learners and social relations. There are several approaches a teacher can employ to manage a classroom and it has been argued that, rather than an interventionist or non-interventionist approach, an interactionist style of classroom management, which "focuses on what an individual does in order to change the environment, as well as how the environment affects the individual" (Djigić & Stojiljković, 2011, p. 822), promises a positive and stimulating classroom climate.

Similarly, the instructional, social, psychological and emotional characteristics of a classroom have been referred to as the classroom climate although terms such as *classroom environment* or *classroom atmosphere* are also employed for the same concept (Barr, 2016; Lee & Mak, 2018). Accordingly, classroom climate can be regarded as the general collective feeling shared by all the participants in the classroom, which embraces "...students' perceptions of the rigor of the class, their interactions with their instructor and class peers, and their involvement in the class" (Barr, 2016, p. 1). The relationship between the teacher and the students as well as the design and structure of the course is determinant in terms of classroom climate and the teacher is expected to build intimate communication with the students by making use of affinity-seeking strategies (Myers, 1995) or making use of nonhostile humor (Stuart & Rosenfeld, 1994) with the aim of fostering a positive classroom climate. A positive classroom climate, thus, encourages learners' engagement, self-determined motivation and empathy towards others as well as satisfying learners' social, emotional and psychological needs and promoting enjoyment of the course (Barksdale et al., 2021; MacLeod et al., 2017).

Classroom climate has generally been regarded as a determining factor of learners' academic success, motivation and satisfaction (Anderson et al., 2004; Barr, 2016; Barksdale et al., 2021; Djigić & Stojiljković, 2011; Dwyer et al., 2004; Johnson, 2006; Johnson, 2009; López et al., 2018); accordingly, the elements of a positive classroom climate can be summarized as follows (Barr, 2016; Barksdale et al., 2021; Djigić & Stojiljković, 2011; Ghaith, 2003; Lee & Mak, 2018; van der Sijde & Tomic, 1992; Van Petegem et al., 2008):

- Greater cohesion and goal-orientedness;
- Less disorganization, reduced anxiety and fewer conflicts;
- More opportunities for learning;
- Mutual respect and understanding;
- Constructive and productive relationship;
- Learners' needs, interests and initiatives are valued;
- Responsibility is shared by the teacher and the learners;

- Good rapport exists between the teacher and learners;
- Collaboration rather than competition.

The teacher functions as the principal agent of building a positive classroom climate and the significant role played by academic self-efficacy and communication in creating a positive classroom climate has been underscored in the relevant literature (Gündoğan & Koçak, 2017). It should not go without saying that the seeds of a positive classroom climate can initially be found in the design of the course; therefore, teachers need to keep their learners' choices and interests in mind even in the planning stage of the course if they would like their learners to perceive their lessons as satisfactory (Barr, 2016). In addition to instructional practices, assessment procedures should also be taken into consideration for a more positive classroom climate. To be more precise, it has been argued that formative assessment supported with self-assessment and peer-assessment may enhance learners' motivation, leading to a more favorable classroom climate (Lee & Mak, 2018). The interdependent relationship between the classroom climate and the motivational instructional practices has also been highlighted in that the latter paves the way for a positive classroom climate while a favorable and relaxed classroom climate enhances the motivational instructional practices on the part of both the teachers and the learners (Lee & Mak, 2018).

As has been argued by Jorgensen (1992), the profession of teaching is a rapport-intensive field. The pivotal role of developing good rapport with and among the students has been well-documented (Barr, 2016; Frisby & Martin, 2010; Van Petegem et al., 2008). Rapport can be described as a mutual feeling between two people that involves trust and prosocial bond (Catt et al., 2007). It should be noted that the term *mutual* in the previous sentence suggests that rapport and the consequent classroom climate are co-constructed by the teacher and students, whose active participation is a requisite throughout the process. Accordingly, the concept of classroom climate can also be approached from the sociocultural perspective; namely, zone of proximal development and scaffolding in a combined fashion may bring about a positive classroom climate (Lee & Mak, 2018). In this respect, positive rapport does not only refer to the relationship between the teacher and the learners but also between and among the learners themselves as well (Barr, 2016). With the aim of achieving positive rapport, teachers need to make learners feel that they are cared for and valued with the help of certain confirming behavior strategies such as responding to their questions, showing interest in their actions and conveying concern towards both the class and the individual students (Barr, 2016). There is no need to say that whereas some learners are surprisingly self-motivated, some others need constant encouragement while following online education, implying that teachers need to be punctual and reliable in terms of responding to learner-initiated communication efforts.

## 2.2. Classroom Climate in Online Learning

Online education has emerged as the best option under the circumstances mandated by the Covid-19 pandemic for more than a year and it can be defined as "...the use of the internet to access materials; to interact with the content, instructor, and other learners; and to obtain support during the learning process, in order to acquire knowledge, to construct personal meaning, and to grow from the learning experience" (Ally, 2008, p. 5). Similarly, Burns (2011) defines online learning as a "...planned learning experience or method of instruction characterized by quasi-permanent separation of the instructor and learner(s)" (p. 9), focusing on structured planning, well-designed courses, special instructional techniques and communication via technology. The implementation of online education is based on four main components. First of all, the design of online education should be institutionally based, which renders it different from self-study. Secondly, the teacher and the students should be separated not only in terms of location but in terms of time as well. The third component of online education is interactive telecommunications, implying that the internet technology is to be utilized throughout the process. Finally, there should be a two-way communication between the teacher and the student to share and

exchange the content and resources to promote learning experiences. According to Simonson et al. (2015), if any of these components does not exist throughout the process, it is not possible to label it as online education. It should be noted at this point that while the traditional approaches to online education highlight the temporal space between the teacher and students, more recent approaches, thanks to the latest innovations in interactive technological facilities, view online education as taking place at the same time but in different places (Simonson et al., 2015). This shift in the understanding of online education is closely linked to the importance attached to interaction between and among the teacher and the students; thus, synchronous, rather than asynchronous forms of online education have become more favorable.

As a response to the developments in technology, many higher education institutions have already started offering online education to their students with the intention of obtaining financial gains or becoming internationalized and digitalized. In this context, the global outbreak of Covid-19 pandemic has accelerated this process and educational institutions at all levels have adopted online education as a substitution for traditional face-to-face education with the aim of eliminating physical contact between and among the teachers and the students. Such sudden switch to online education, not surprisingly, has resulted in certain challenges for both the teachers and the students. To be more precise, online education necessitates readiness on the part of all the stakeholders; namely, the educational institution, the teachers and the students (Simonson et al., 2015). It would be justified to argue that none of the stakeholders were quite ready for such sudden shift to online education. In this respect, the adoption of online education has led to transformations in the roles and responsibilities of both teachers and learners (Altmann et al., 2019; Boz Yüksekdağ, 2016; Devran & Elitaş, 2016). More specifically, transition to online education has charged teachers with some extra new tasks in that teachers need to become guides, mentors and effective communicators, improve learners' social skills and assist learners in technical issues as well as fulfilling their conventional pedagogical roles (Boettcher & Conrad, 2016; Kavrat & Türel, 2013; Yuan, 2021). In a similar vein, students need to take more responsibility of their own learning and manage their time more effectively in the process of online education.

Creating a positive classroom climate is one of these challenges since online courses have their *own* climates (Cole et al., 2019). Parker and Herrington (2015) offer a model with four sub-sections (namely, *physical environment*, *building rapport*, *emotional expression* and *instructional management*) for constructing climate in traditional face-to-face classrooms and suggest that the model “may assist online educators to develop physical, social, emotional and instructional supports to set a positive climate of open communication and friendly interaction to encourage student engagement in an online community of learning” (p. 7). Thus, it can be argued that creating a positive classroom climate is much easier in traditional face-to-face education in comparison to online education since communication between and among the teacher and the students may not occur as effectively and instantly as it does in face-to-face contexts. In this respect, online learning climate has been defined by Kaufmann et al. (2016) as “the emotional atmosphere, feeling, and or connection in the course with the instructor and students” (p. 312). Unquestionably, online education brings certain challenges with it as well as several benefits; however, constructing a positive classroom climate in online settings requires distinct competences on the part of the teachers. Furthermore, it can be argued that students have experienced intense social isolation for prolonged periods due to lockdowns across the country and lost their motivation towards online education. When compared with traditional face-to-face courses, online courses feature diverse components and considerations of accessibility; therefore, online courses need to be designed and delivered with the modality in mind (Kaufmann & Vallade, 2020; Yuan, 2021). Another challenge presented by online education is the learning management system, application or web-site that has been utilized for online education since it may also feature certain limitations, leading to difficulties in creating a positive classroom climate. It should also be admitted that there may also be shortcomings peculiar to individual students (such as lack of technical equipment, time or internet connection), which renders the

task of building a positive classroom climate almost impossible and, unfortunately, cannot be controlled or solved by the teacher.

The fact that both the teacher and the students are online does not necessarily come to mean that the online classroom climate is favorable. According to Kaufmann and Vallade (2020), online learning may turn out to be a lonely experience for most of the students. In this respect, they have carried out a study aiming to reveal how rapport and climate may alleviate the perceptions of loneliness and underscored the importance of the teacher's role in building and maintaining rapport and climate (Kaufmann & Vallade, 2020). Likewise, Montebello (2018) and Cole et al. (2019) have observed that some students feel isolated despite being able to communicate with the teacher and their peers during online education because they wish to interact with them in a face-to-face fashion. The teacher or the instructor holds the main responsibility for helping learners to combat such sense of isolation by facilitating discussions related to learners' interests and making use of confirmation behaviors (Cole et al., 2019). In a similar vein, Alles et al. (2019) explored the development of the learning atmosphere and conversation culture in a longitudinal study and concluded that both of the constructs were relatively positive at the beginning and a slight increase was observed over time. Therefore, sense of community, or more commonly connectedness, stands out as a key feature of online classroom climate in that both the teacher and the students need to feel connected to the idiosyncrasies of the classroom to achieve a favorable classroom climate. Connectedness also refers to the relationship and interaction between and among the students as, in addition to the teachers, students should also be able to comment on and appreciate their peers' progress since the instruction does not just happen between the teacher and the students, but among the students as well. As has been reported by Barr (2016), Johnson (2009), Kaufmann & Vallade (2020) and Simonson et al. (2015), a connected classroom climate increases students' motivation, preparedness and participation as well as discouraging cheating.

It should also be noted that concerns as to lack of communication and interaction between the teacher and students in online education contexts have been reported (Allen, 2006). More specifically, lack of interaction between and among the teacher and the students due to technical problems has been argued to damage students' motivation, leading to disruptions in classroom climate (Birişçi, 2013; Bogolepova, 2021; Wiranto et al., 2021). In a similar vein, Vallade and Kaufmann (2018) have focused on the effects of instructors' communication and behavior on students' experiences in online learning and reported the detrimental effects of instructors' misbehavior on students' perceptions and satisfaction. On the other hand, the findings of the study conducted by Cole et al. (2019) indicate that collaboration and effective interaction among the students result in better online learning climate and higher student engagement. Interaction is a crucial factor in online education in that it shapes the level of social presence of the learners. When learners are socially absent in online education, they are likely to become inactive and disengaged throughout the process (Bayrak et al., 2017; Kaufmann et al., 2016). In line with this, it would be justified to argue that the design of online education platforms should be arranged in such a way that will enable the learners to become socially present by expressing themselves freely, sharing their opinions and feeling a sense of community. To summarize, Kaufmann et al. (2016) maintain that the behaviors of instructors play a significant role in constructing a positive online classroom climate in that the instructors need to be respectful, understanding, supportive, responsive, engaged and understanding. In addition, the structure and clarity of the course should be designed in such a way to enable students to communicate, interact and collaborate with their peers and their instructor. Student connectedness should also be paid attention by the instructors by encouraging respectful cooperation among the students since attitudes and perceptions of students have been closely linked to success in online education (Başar et al., 2019; Vallade & Kaufmann, 2018).

### *2.3. Purpose and Significance of the Study*

Due to the global outbreak of Covid-19 pandemic, a harsh and compulsory transition to online education has been experienced by educational institutions across the globe. Nevertheless, the emergency of the situation has not made it possible to allow sufficient time for the stakeholders to get prepared for this shift. Considering the assertion that the attitudes of learners stand as the most important factor for success in online education (Başar et al., 2019) and the perceptions of learners are the key point for understanding classroom climate (Schenke et al., 2017), this study aims to investigate pre-service teachers' perceptions on classroom climate throughout the process of emergency online education. The significance of the present study lies in the fact that the construct of classroom climate has been explored extensively in traditional face-to-face settings whereas there is a scarcity of research as to classroom climate in online education contexts (Kaufmann et al., 2016). Furthermore, the prevalence of online education during the Covid-19 pandemic adds to the significance of the present study. Therefore, this study aims to shed light on the online learning climate perceptions of pre-service teachers in Turkish context and provide teachers and instructors with suggestions that can help to improve online classroom climate in line with the findings of the research.

### *2.4. Statement of the Problem and Research Questions*

The main question of this research is:

-How do pre-service teachers perceive online learning climate and do the perceptions of pre-service teachers on online learning climate differ according to their gender, department, grade level, level of digital literacy and the time they daily spend online?

In response to this question, this study aims to identify online learning climate perceptions of pre-service teachers by shedding light on the variables that have an influence on their perceptions. Therefore, the research questions to be dealt with in this study are:

1. What is the level of overall perception of pre-service teachers on online learning climate?
2. Do the perceptions of pre-service teachers on online learning climate differ according to:
  - a) their gender?
  - b) their department?
  - c) their grade level?
  - d) their level of digital literacy?
  - e) the time they daily spend online?

## **3. Methodology**

### *3.1. Research Model/Design*

With the aim of answering the research questions, a quantitative research method, namely a single scan model, one of the general scan models, has been utilized in this study since the main purpose of the study is to reveal the current state of a situation that has been experienced or is being experienced (Karasar, 2000).

### 3.2. Data Collection Tool(s)

A self-report questionnaire (SRQ) has been employed with the aim of collecting relevant data within this study. SRQ can be defined as an instrument “...in which participants typically are presented with a set of specific statements, questions, or prompts and must respond to each by selecting one of several options provided on the instrument” (Wolters & Won, 2017, p. 308). The set of specific statements, questions, or prompts make it possible to collect the respondents’ perceptions, attitudes, abilities, knowledge, beliefs or behaviors regarding the subject under study. The reason why a SRQ has been adopted within the study is that SRQ is comparatively more convenient and affordable to produce, administer, score and analyze. More specifically, the limitations mandated by the Covid-19 pandemic have rendered the SRQ the most convenient tool for this study.

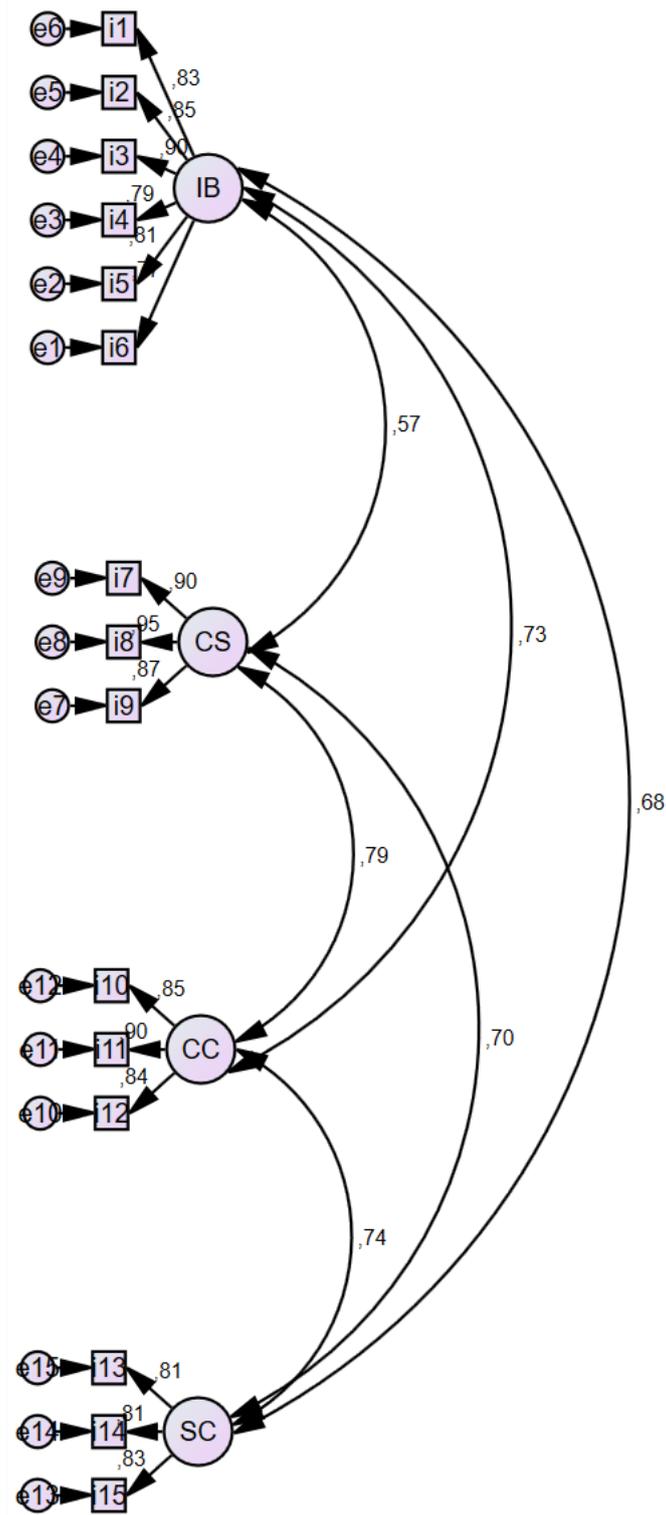
As a result, the data collection tool adopted with the aim of gathering the necessary data for the statistical analyses consists of two sections. In the first section of the data collection tool, participants are requested to provide their demographic information such as their genders, departments, classes, digital literacy levels and time they daily spend online. The second section of the data collection tool aims to collect participants’ perceptions of online learning climate; thus, ‘Online Learning Climate Scale’ (OLCS), developed and validated by Kaufmann et al. (2016), has been employed. The procedures of adaptation of OLCS into Turkish and details as to the validity and reliability of OLCS have been explicated below.

#### 3.2.1. Online Learning Climate Scale (OLCS)

The OLCS consists of 15 items, distributed under four factors, and it aims to explore classroom climate in online settings, which is co-constructed by the teacher, students and course design. More specifically, the OLCS has been structured in a 7-point Likert-type design (1: *strongly disagree* and 7: *strongly agree*). Items between 1 and 6 (6 items) comprise *Instructor Behaviors* (IB); items between 7 and 9 (3 items) comprise *Course Structure* (CS); items between 10 and 12 (3 items) comprise *Course Clarity* (CC); and items between 13 and 15 (3 items) comprise *Student Connectedness* (SC) factors. As can be understood, the OLCS covers variables such as the roles and behaviors of teachers, characteristics of students and aspects of the structure and design of the course with the aim of identifying learners’ perceptions of the online learning climate. In this respect, the OLCS aims to shed light on *instructor behaviors, student characteristics and behaviors, and course-specific structural issues* with a specific reference to understanding their influence on the perception of classroom climate (Kaufmann et al., 2016). It should also be noted that in the item generation process of the OLCS, the Instructional Beliefs Model (Weber, Martin & Myers, 2011) has been adopted as the theoretical framework.

The first step of the adaptation process of the OLCS involves the translation of the scale into Turkish by one of the researchers. As a next step, the original and the translated forms of the OLCS have been examined by three experts who hold PhDs in the field of English language teaching. Their suggestions for revision have been implemented and the final version of the Turkish form of the OLCS has been checked by another expert holding her PhD in the field of Turkish language education. The final version of the Turkish form of the OLCS has been obtained in line with the recommendations of the Turkish language education expert. At the end of this process, it has been regarded by the researchers that the content validity of the OLCS has been mastered. After the final version of the Turkish form of the OLCS has

been arrived at, the first stage of pilot study with 10 English Language Teaching department students has been conducted and the readability as well as comprehensibility of the OLCS has been assured. Finally, the second stage of the pilot study has been conducted with 300 pre-service teachers to demonstrate the confirmatory factor analysis (CFA) (see Figure 1).



(IB: Instructor Behaviors, CS: Course Structure, CC: Course Clarity, SC: Student Connectedness)

Figure 1. OLCS Factor Analysis

Figure 1 presents the relationship between the factors of the OLCS and the items in each factor. It has been observed that the correlation coefficients calculated between the factors and their items vary between .75 and .91. According to Büyüköztürk (2002), the relationship coefficient of 0.60 and above can

be interpreted as high-level correlation. When the numerical values are examined, it can be argued that the correlation coefficients calculated between the factors and their items are perfectly acceptable. As a result of the analyses, it is seen that  $\chi^2 = 327.70$ ,  $p = .000$ ,  $df = 84$ ,  $\chi^2 / df = 3.90$  are significant. Furthermore, Figure 3 demonstrates that the adapted form of the OLCS includes four factors and it is compatible with the original form of the OLCS. Table 1 gives corrected item total correlation.

**Table 1.***Item-Total Correlation*

Item No	Corrected Item Total Correlation
1	0.697
2	0.711
3	0.772
4	0.715
5	0.650
6	0.676
7	0.727
8	0.767
9	0.722
10	0.778
11	0.793
12	0.743
13	0.678
14	0.666
15	0.742

When Table 1 is examined, it is seen that all the values are greater than 0.50 (Francis & White, 2002; Kim & Stoel, 2004). As has been stated by Lord and Novick, “the higher the item-test correlations, the higher the coefficient  $\alpha$ ” (2008, p. 331). Results of the confirmatory factor analysis (CFA) have been provided in Table 2.

**Table 2.***Confirmatory Factor Analysis Results for OLCS*

Index	Perfect fit criteria	Good fit criteria	Research finding	Result
$\chi^2/df$	0-3	3-5	3.90	Good fit
RMSEA	$.00 \leq RMSEA \leq .05$	$.05 \leq RMSEA \leq .10$	.098	Good fit
CFI	$.95 \leq CFI \leq 1.00$	$.90 \leq CFI \leq .95$	.94	Good fit
SRMR	$0 \leq SRMR \leq .05$	$.05 \leq SRMR < 0.10$	0.045	Perfect fit
NNFI (TLI)	$.95 \leq NNFI (TLI) \leq 1.00$	$.90 \leq CFI \leq .95$	0.92	Good fit
NFI	$.95 \leq NFI \leq 1.00$	$.90 \leq NFI \leq .95$	.92	Good fit
RFI	$.95 \leq RFI \leq 1.00$	$.90 \leq RFI \leq .95$	.91	Good fit
GFI	$.95 \leq GFI \leq 1.00$	$.90 \leq GFI \leq .95$	0.93	Good fit
AGFI	$.90 \leq AGFI \leq 1.00$	$.85 \leq AGFI \leq .90$	0.86	Good fit

When Table 2 is examined, the value ( $\chi^2 / df = 3.90$ ) obtained by proportioning the chi-square fit index value to the degree of freedom indicates that it is below 9, which is regarded as an acceptable or perfect value (Marsh & Hocevar, 1988). In addition, when RMSEA, CFI, SRMR, NNFI, NFI, RFI, GFI, AGFI

values are examined, it is seen that the model features good fit or perfect fit (Fan et al., 1999; Hu & Bentler, 1999).

The internal consistency coefficient, which indicates the reliability of the scale, has been found as stratified coefficient alpha = .85. Likewise, the reliability of the factors are computed as: Instructor Behaviors  $\alpha = .93$ , Course Structure  $\alpha = .93$ , Course Clarity  $\alpha = .90$ , Student Connectedness  $\alpha = .86$ . Therefore, the scale is considered to have internal consistency. It should also be noted that the obtained results concur with the findings reported by Kaufmann et al. (2016). In this respect, as a result of the CFA conducted, it can be argued that the adapted form of the OLCS is a valid and reliable data collection tool.

### 3.3. Study Group

The study group of the present research consists of a total of 348 volunteer pre-service teachers studying in six different departments at the Faculty of Education, Süleyman Demirel University. The technique of *convenience sampling* (Dörnyei, 2007; Nunan, 1992) has been employed within this study in that the participants have been selected because of their convenient accessibility and proximity to the researchers. Since all the participants provided the requested information, there was no lost data. Demographic information of the participants has been presented in Table 3.

**Table 3.**  
*Demographic Information of the Participants*

Department	Number of Participants		Total	Department %
	Female	Male		
English Language Teaching	46	12	58	17
Elementary Mathematics Education	33	5	38	10
Science Education	37	10	47	14
Primary School Teacher Education	87	28	115	33
Turkish Language Teaching	35	12	47	14
Social Studies Education	37	6	43	12
<b>Total</b>	<b>275</b>	<b>73</b>	<b>348</b>	<b>100</b>

It should also be noted that pre-service teachers from different grade levels have participated in the study. More specifically, of the 348 pre-service teachers who participated in the study, 121 are freshmen; 109 are sophomore; 61 are junior; and 57 are senior.

### 3.4. Data Analysis

The assumptions of a CFA include multivariate normality, a sufficient sample size ( $n > 200$ ), the correct a priori model specification, and data must come from a random sample. It is seen that all assumptions are met for the confirmatory factor analysis. For the analysis of the data obtained, parametric analysis methods; namely, independent samples t-test and one-way analysis of variance (ANOVA) are to be employed. However, prior to the analyses, the number of the participants ( $N=348$ ) and continuity of the data (OLCS scores) have been checked and it has been observed that the data are suitable for the analyses. As a next step, the values obtained by dividing the skewness (-0.486) and kurtosis (-0.455) coefficients of the data into standard errors have been examined to ensure normality (McKillup, 2012; Tabachnick & Fidell, 2014; Wilcox, 2012) and it has been observed at the end of this analysis that the both of the values

are outside the  $\pm 2$  limit. It should also be noted that skewness-kurtosis alone is not enough to decide on normality. Thus, since the total number of participants is over 35, Kolmogorov-Smirnov test has been implemented and, in line with its results (0.08,  $p=.00$ ), it can be argued that it does not meet the normal distribution condition. Similarly, the Q-Q charts support this finding as well. Finally, it has been decided that the data are not distributed normally. As a result, Mann-Whitney U test and Kruskal-Wallis H test, which are non-parametric tests, have been employed for the analyses.

### 3.5. Research Procedures

The data collection process for this study started in October, 2020 following the approval of Süleyman Demirel University Ethics Board and ended at the end of November, 2020. Due to the restrictions mandated by Covid-19 pandemics, no physical contact has been allowed; therefore, the data collection tool has been uploaded on an online platform (forms.google.com) and the link has been shared with the pre-service teachers. Participants have been informed about the content as well as the aim of the study and their consents have been obtained before they have been asked to participate in the study.

### 3.6. Ethical Procedures

The implementation of the present study has been approved by Süleyman Demirel University Ethics Board (September 14, 2020 / 96-11). The researchers have adhered to all ethical principles and rules in the collection, analysis, and reporting of the data for the study.

## 4. Findings

In this section of the study, the results of the analyses conducted for each research question have been presented.

*Research Question 1. What is the level of overall perception of pre-service teachers on online learning climate?*

The arithmetic mean and standard deviation values for the OLCS are given in Table 4 with the aim of answering the first research question.

**Table 4.**  
*Statistics for OLCS and its Factors*

Factors / OLCS	N	X	Percentage of scores (%)	Standard deviation	Minimum and maximum scores that can be achieved
Instructor Behaviors	348	31.66	75.38	8.14	6-42
Course Structure	348	11.69	55.67	5.78	3-21
Course Clarity	348	13.43	63.95	4.95	3-21
Student Connectedness	348	14.32	68.19	5.04	3-21
OLCS	348	71.10	67.71	20.48	15-105

All the items in the OLCS are positive and the mean scores of the responses given to all the items have been computed accordingly. Since the OLCS consists of 15 items, the maximum possible score is 105 whereas the minimum score is 15 within the scale. As the number of items in the first factor is 6 while the number of items in other three factors is 3, the total scores that can be obtained are different. Therefore,

with the aim of making a comparison among the factors possible and easier, the mean scores have been converted into percentages by correcting them according to the total score. As a result, the highest mean score has been observed in the ‘*Instructor Behaviors*’ factor with a score of % 75.38. There are 6 items in this factor of the OLCS. The highest score that can be obtained here is 42 whereas the lowest possible score is 6. Similarly, the percentage of mean scores in the ‘*Student Connectedness*’ factor is % 68.19. There are 3 items in this factor of the OLCS. While the highest score that can be obtained in this factor is 21, the lowest possible score is 3. Likewise, the percentage of pre-service teachers’ mean scores in the ‘*Course Clarity*’ factor is % 63.95. Finally, the percentage of pre-service teachers’ mean scores in the ‘*Course Structure*’ factor is % 55.67. It should be noted that pre-service teachers’ perceptions on the factor of course structure is the lowest in comparison to the other factors. When it comes to the pre-service teachers’ overall perceptions of the OLCS, the percentage of their mean scores has been computed as % 67.71.

*Research Question 2. Do the perceptions of pre-service teachers on online learning climate differ according to:*

*a) their gender?*

Mann-Whitney U test has been conducted to reveal whether the perceptions of pre-service teachers on online learning climate differ according to their gender. The findings of the analysis have been presented in Table 5 below.

**Table 5.**

*U-Test Results for OLCS according to Gender*

Gender	N	Mean rank	Sum of rank	U	p
Female	275	175.98	48393.50	9631.50	,59
Male	73	168.94	12332.50		

\*p<0.05

As can be understood from Table 5, the mean scores of female pre-service teachers on the OLCS (175.98) are higher than those of their male counterparts (168.94). However, Mann-Whitney U test results indicate that the observed difference is not statistically significant (U=9631.50; p>0,05). To put it differently, the perceptions of pre-service teachers on online learning climate do not differ according to the gender of participants.

*b) their department?*

Kruskal-Wallis H test has been conducted to reveal whether the perceptions of pre-service teachers on online learning climate differ according to the department they study. The findings of the analysis have been presented in Table 6 below.

**Table 6.**  
*Kruskal-Wallis H Test Results for OLCS according to Department*

Department	n	Mean rank	sd	$\chi^2$	p	Significant difference	Effect size
English Language Teaching	58	162.95				Elementary Mathematics Education – Primary School Teacher Education	0.50
Elementary Mathematics Education	38	216.87					
Science Education	47	199.32	5	13.40	.02		
Primary School Teacher Education	115	159.89					
Turkish Language Teaching	47	163.35					
Social Studies Education	43	176.78					

Table 6 shows that the mean scores of pre-service teachers studying at the department of elementary mathematics education are the highest (216.87) whereas the mean scores of pre-service teachers studying at the department of primary school teacher education are the lowest (159.89). Moreover, Kruskal-Wallis H test results show that the difference observed is statistically significant ( $\chi^2(5) = 13.40, p < 0.05$ ). Subsequently, Mann-Whitney U test has been implemented to determine the level of difference between and among the groups. The findings show that the mean scores of pre-service teachers studying at the department of elementary mathematics education are higher than the mean scores of pre-service teachers studying at the department of primary school teacher education, with the difference being at moderate level.

*c) their grade level?*

Kruskal-Wallis H test has been conducted to reveal whether the perceptions of pre-service teachers on online learning climate differ according to their grade level. The findings of the analysis have been presented in Table 7 below.

**Table 7.**  
*Kruskal-Wallis H Test Results for OLCS according to Grade Level*

Grade Level	n	Mean rank.	sd	$\chi^2$	p	Significant difference	Effect size
Freshman	121	199.17				Senior - Junior	0.52
Sophomore	109	154.26	3	192.23	.00	Freshman - Junior	0.52
Junior	61	144.16				Freshman - Sophomore	0.46
Senior	57	193.31					

Table 7 indicates that the mean scores of freshman pre-service teachers are the highest (199.17) whereas the mean scores of junior pre-service teachers are the lowest (144.16). Furthermore, Kruskal-Wallis H test

results indicate that the difference observed is statistically significant ( $\chi^2(3) = 192.23, p < 0.05$ ). As a next step, Mann Whitney U test has been conducted to determine the level of difference between and among the groups. The findings show that the mean scores of senior pre-service teachers are higher than the mean scores of junior pre-service teachers, with the difference being at moderate level. Similarly, it has been observed that the mean scores of freshman pre-service teachers are higher than the mean scores of both junior and sophomore pre-service teachers, again with the difference being at moderate level.

*d) their level of digital literacy?*

Kruskal-Wallis H test has been conducted to reveal whether the perceptions of pre-service teachers on online learning climate differ according to their level of digital literacy. The findings of the analysis have been presented in Table 8 below.

**Table 8.**

*Kruskal-Wallis H Test Results for OLCS according to Level of Digital Literacy*

Digital Literacy Level	n	Mean rank	sd	$\chi^2$	p	Significant difference	Effect size
Basic	155	167.99				Very Good - Basic	0.38
Good	161	172.02	2	6.87	.03		
Very Good	32	218.48					

Table 8 shows that the mean score of pre-service teachers with basic digital literacy is the lowest (167.99) whereas the mean score of pre-service teachers with very good digital literacy is the highest (218.48). Furthermore, Kruskal-Wallis H test results indicate that the difference observed is statistically significant ( $\chi^2(2) = 6.87, p < 0.05$ ). As a next step, Mann Whitney U test has been conducted to determine the level of difference between and among the groups. The findings show that the mean scores of pre-service teachers with very good level of digital literacy are higher than the mean scores of pre-service teachers with basic level of digital literacy, with a small effect size.

*e) the time they daily spend online?*

Kruskal-Wallis H test has been conducted to reveal whether the perceptions of pre-service teachers on online learning climate differ according to the time they daily spend online. The findings of the analysis have been presented in Table 9 below.

**Table 9.**

*Kruskal-Wallis H Test Results for OLCS according to the Time Daily Spent Online*

Time Daily Spent Online	n	Mean rank	Sd	$\chi^2$	p	Significant difference
1-2 hours	81	163.09				No difference
3-4 hours	138	167.30				
5-6 hours	77	193.68	3	4.97	.17	
7+ hours	52	182.53				

Table 9 indicates that the mean score of pre-service teachers who daily spend 1-2 hours online is the lowest (163.09) whereas the mean score of pre-service teachers who daily spend 5-6 hours online is the highest (193.68). Nonetheless, Kruskal-Wallis H test results suggest that the observed difference is not

statistically significant ( $\chi^2(3) = 4.97, p > .05$ ). More plainly, the perceptions of pre-service teachers on online learning climate do not differ according to the time they daily spend online.

## 5. Discussion and Conclusion

The main aim of this study is to investigate pre-service teachers' perceptions on the construct of online classroom climate. The results of the analyses indicate that the pre-service teachers' overall perceptions on the OLCS are at less than moderate level. More precisely, in line with the wording of the 7-point Likert-type items in the OLCS, their mean score is somewhere between 'neither agree nor disagree' and 'somewhat agree' rather than 'agree' or even 'strongly agree', which implies that the construct of climate in online courses need to be paid more attention with the aim of enhancing pre-service teachers' online learning climate perceptions. This interpretation concurs with the findings of a previous research conducted by Gündoğan & Koçak (2017) with pre-service teachers in Turkish context in that their participants' perception of the school climate is also at less than moderate level. As to the factors of the OLCS, it can be argued that pre-service teachers' perceptions on the instructor behaviors factor of the OLCS are the highest and they mostly agree with the items under the factor of instructor behaviors. In other words, pre-service teachers perceive their instructors as understanding, respectful, responsive, engaged, approachable and supportive. This finding demonstrates that instructors have been able to construct a positive online classroom climate by building good rapport with their students. It should be noted at this point that the findings of another study conducted by Koç (2020) in Turkish context have revealed that lack of communication and interaction has negative effects on both the instructors and the students. However, the factor of instructor behaviors, which contains items as to the communication and interaction between the teacher and the students have been positively perceived in the present study. In a similar fashion, it can be argued that the pre-service teachers' perceptions on the student connectedness and course clarity factors of the OLCS are somewhat high. On the other hand, pre-service teachers' perceptions on the factor of course structure are the lowest in comparison to the other factors. This may be related to the urgent switch to online education due to Covid-19 pandemic, which has hardly allowed enough time for the instructors to design and arrange their courses in line with the requirements of online education context. More precisely, the instructors may not have had enough experience to design and deliver their courses online. Another reason for this may be the lack of sufficient training as to the design and delivery of online courses.

This study has also aimed to investigate the independent variables that may have an influence on the OLCS perceptions of pre-service teachers. To start with, the perceptions of pre-service teachers on online learning climate do not differ according to gender, which conflicts with the findings of Başar et al. (2019) as they have reported that online education perceptions of male pre-service teachers are higher than their female counterparts. In contrast, it has been argued by Crawford and MacLeod (1990) that female teachers are usually better at constructing a positive classroom climate and a positive classroom climate for female learners turns out to be a better learning environment for all learners. As to the departments of the participants, it has been observed that the perceptions of pre-service teachers studying at the department of elementary mathematics education are the highest. The reason for this finding may be the fact that the instructors employed in the department of elementary mathematics education utilized a learning management system prior to the Covid-19 pandemic, and as a result, the pre-service teachers in this department have longer experience in online learning. With regard to the grade levels of the pre-service teachers, Wang et al. (2020) have reported at the end of their meta-analytic study that grade level of the students does not have an influence on their classroom climate perceptions. On the other hand, Özdemir et al. (2020) conclude at the end of their study in Turkish context that as the grade level of the students increase, their perceptions of the classroom climate decrease. Nevertheless, the results of the present study indicate that pre-service teachers in their first and final years have more positive perceptions

towards classroom climate than their sophomore and junior counterparts. In a similar vein, a correlation between the digital literacy levels and the OLCS perceptions of pre-service teachers has been observed in that the higher their digital literacy levels, the higher their perceptions on the OLCS. This interpretation has also been supported by the findings of Macleod et al. (2017), who conclude that higher technological competency enables learners to feel more connected in online classroom climate. Furthermore, in terms of time pre-service teachers daily spend online, it can be contended that as the time pre-service teachers spend online increases, their digital literacy level also improves, which directly contributes to their perceptions of online learning climate.

Moos (2017) argues that integration of technology into educational settings with the aim of improving quality of learning experience for students is not a new phenomenon; however, “current integration reflects a growing trend to design environments that enable students to learn *with*, as opposed to *from*, classroom technology” (p. 243, *italics in original*). In line with this, as has been observed by Devran and Elitaş (2016), it is highly likely that using technology in the process of online education may turn out to be a challenge for the teachers and students. Thus, it would be fair to argue that both parties need to be trained prior to the implementation of online education. Moreover, the design of online courses need to be executed with a specific reference to the needs, interests, resources, affordances, preferences and perceptions of the learners (Başar et al., 2019). Furthermore, the important role of classroom climate in fostering the overall quality of education and promoting learners’ academic, emotional, social and psychological well-being has been recognized by an increasing number of countries (Barksdale et al., 2021; López et al., 2018; Van Petegem et al., 2008) and enhancement of classroom climate has become a main goal of educational institutions in the process of reform efforts (Shewark et al., 2018; Wang et al., 2020). With the aim of achieving a positive classroom climate, teachers need to create a safe and supportive atmosphere, revise their attitudes towards learners’ mistakes and errors, make use of motivational instructional strategies, balance formative and summative assessment practices, build good rapport with the students and encourage them to develop good relationships with their peers (Lee & Mak, 2018). Motivation is a crucial construct in any instructional context; however, its importance in online learning is even greater (Montebello, 2018).

It is clear that online education brings certain challenges with it; however, the sudden outbreak of Covid-19 pandemic has left no options other than online education, which functions as an emergency solution. In this context, with the aim of achieving success in online education and building positive classroom climate, a teacher needs to design the content and delivery of the course in line with the restrictions and opportunities of online education (Kaufmann et al., 2016) and evade from transplanting traditional face-to-face course onto the internet since “while teaching online can be informed by the same theories of learning as face-to-face instruction, the enactment of the online experience, for both teachers and students, will - and should - differ significantly from the physical classroom” (Boettcher & Conrad, 2016, p. xviii). As has been suggested by Simonson et al. (2015), teachers need to put their creativity and imagination into the design and structure of their online courses in order to engage learners. Additionally, the organization of the course and requirements expected of the learners should be made clear to the learners as soon as possible. Needless to say, there should be intimate communication between the teacher and the learners; thus, learners should be kept informed constantly. In a similar vein, an online discussion forum inviting learners to ask their questions and express their opinions may prove useful because the teacher can get continuous feedback from the learners as to the process of online education. The platform or interface used for online education may also be a challenge for some of the learners; therefore, training(s) as to the operation of the platform or interface should be provided for such learners in advance. In addition, teachers should try to see technology as a facilitative tool rather than an obstacle, implying that the power of technology can be integrated into the course especially during the delivery of the course. It should not go without saying that instructional methods employed by the teacher should also be suited to the aims and peculiarities of online education. More precisely, instead of traditional lecturing style,

teachers should encourage learners to participate and communicate both with the teacher and their peers. The teacher may achieve this by assigning group works on the part of the students, which will enhance interaction among them and lead to collaboration (Ghaith, 2003). Furthermore, assessment of students' performances in online education also stands as a challenge both for the teachers and the students. In response to this challenge, formative rather than summative assessment techniques can provide a more reliable and valid view of the learners' progress. More precisely, alternative assessment procedures such as e-portfolio, project work and/or self-/peer-assessment may be utilized along with traditional assessment procedures. All in all, teachers need to exhibit sympathy, understanding, support and availability throughout the whole process in order to build a positive online classroom climate (Kaufmann et al., 2016).

### 5.1. Implications

It is highly likely that online education will not be quitted in the period of so-called 'new normal' when Covid-19 pandemic is over (Wiranto et al., 2021). Thanks to the advantages it offers, online education will probably continue to be utilized either as a substitution or as a supplement to traditional face-to-face education (Altmann et al., 2019; Karasu & Sari, 2019; Wieser & Seeler, 2019). Thus, as an educational implication, the findings of the study may prove useful for the development of future online courses and in the training of pre-service or in-service teachers for conducting online courses. Furthermore, the findings of the present research may enable course designers, instructors and teachers to become more aware of the perceptions of their learners on the issue of classroom climate in online education. Such data may be considered as valuable since it directly shapes emotional, social and psychological well-being of the learners as well as their academic achievement and satisfaction with the course. More specifically, as has been suggested by Gündoğan & Koçak (2017), courses may be integrated into the curricula of teacher training institutions with the aim of constructing positive classroom climate not just for traditional face-to-face education contexts but for online contexts as well. In a similar vein, in-service trainings may be organized for in-service teachers to update and enhance their practices in terms of creating positive classroom climate. Finally, it would be justified to argue that a valid and reliable scale has been offered to Turkish context with the aim of shedding light on the construction and nature of classroom climate in online settings.

## 6. Statement of Responsibility

Ahmet Önal; design of the project, conceptualization, methodology, resources, adaptation of the data collection tool, data collection, writing - original draft, writing - review & editing. Atilla Özdemir; design of the project, conceptualization, methodology, resources, validation, data analysis, writing - review & editing.

## 7. Conflicts of Interest

No potential conflict of interest has been reported by the authors.

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## Appendix

## Çevrimiçi Öğrenme Ortamı Ölçeği

	1*	2	3	4	5	6	7**
<b>Çevrimiçi derslerde eğitmenle etkileşimimi temel alarak, eğitmen hakkında düşüncelerim şu şekildedir:</b>							
1. Anlayışlıdır.							
2. Bana karşı saygılıdır.							
3. Destekleyicidir.							
4. Dönüt vermeye duyarlıdır (örneğin ödevlere zamanında geridönüt verir).							
5. Dersiyle ilgilidir.							
6. Ulaşılabilir (örneğin e-posta atabilir veya sanal danışma saatlerinde ziyaret edebilirim).							
<b>Çevrimiçi derslerle yaşadığım tecrübelerime ve algılarıma dayanarak:</b>							
7. Derslerin tasarımı öğrenciler arasındaki etkileşimi teşvik etmektedir.							
8. Derste kullanılan teknoloji öğrenciler arasında işbirliğini teşvik etmektedir.							
9. Çevrimiçi dersler öğrenciler arasında iletişim açısından bolca imkan sunmaktadır.							
<b>Çevrimiçi derslerle yaşadığım tecrübelerime ve algılarıma dayanarak:</b>							
10. Ders açık ve net şekilde yapılandırılmıştır.							
11. Teknoloji kullanımı için verilen yönergeler açık ve nettir.							
12. Ödevler için verilen yönergeler açık ve nettir.							
<b>Çevrimiçi derslerde sınıf arkadaşlarımla etkileşimlerimi temel alarak, düşüncelerim şu şekildedir:</b>							
13. Öğrenciler birbirlerine karşı saygılıdır.							
14. Öğrenciler birbirleriyle işbirliği içerisindedir.							
15. Öğrenciler birbirlerine karşı rahat hissederler.							

\*Benim için hiç doğru değil.

\*\*Benim için oldukça doğru.