

## **Achievement and Perceived Satisfaction, Collaboration and Social Presence of Pre-Service Teachers in a Blended Learning Environment**

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### **Abstract**

This case study aimed to investigate whether the perceived satisfaction, collaboration, and social presence of pre-service teachers predicted their achievement in a blended learning environment and differed significantly according to their gender and departments. This study was conducted during the fall semester of 2019-2020 for six weeks at an educational sciences course in a public university in Turkey. 149 pre-service teachers were chosen according to the purposive sampling method. In this study, the course design was based on the 'Blending with Purpose' multimodal model, and data were collected through course grades and the application of the 'Satisfaction, Collaboration and Social Presence Scale'. After conducting the descriptive and inferential statistical analysis, it was found that satisfaction, collaboration, social presence, and academic achievement of pre-service teachers correlated significantly in a positive direction, but only the satisfaction in the course predicted their achievement. Also, this study found some significant differences in terms of gender and department according to the academic achievement, satisfaction, collaboration, and social presence of pre-service teachers. The possible explanations for these results were examined and discussed in detail.

**Keywords:** Academic Achievement; Blended Learning; Collaboration; Satisfaction; Social Presence

**DOI:** 10.29329/ijpe.2021.375.20

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## INTRODUCTION

Blended learning (BL) is a combination of both face-to-face (F2F) and online learning where instruction is provided both in the classroom and asynchronous and/or synchronous online environments in which the online part becomes a natural extension of the F2F part (Dang et al., 2016; Lim & Morris, 2009; So & Bonk, 2010). There are many benefits of BL such as flexibility of learning time, and place thanks to the online part (Jonker et al., 2020), an increased interaction among learners and instructor (Baepler et al., 2014; Jonker et al., 2020; So & Bonk, 2010; Weaver, 2005; Yang et al., 2018). Moreover, BL increases satisfaction and collaboration, encourages social competencies and social presence, exposes students to alternative points of views in which they can learn a wide variety of subject domains (De Wever, et al., 2015; So & Brush, 2008; Yang et al., 2018). Moreover, the results of studies stressed the fact that although learners' classroom seating time is reduced due to BL, they were as successful and satisfied as the learners in traditional instruction (Baepler et al., 2014; Delialioglu, & Yildirim, 2008). In addition, many studies revealed that student learning is significantly better in blended courses than traditional courses (Baepler et al., 2014); however, others revealed insignificant results in students learning (Delialioglu & Yildirim, 2008; Han, 2013). However, despite the increasing adoption of BL, pedagogical changes to teach in BL environments have been slow. BL is not about including online part but continuing to teach through traditional presentations. For this reason, the current study included an active BL design approach. Also, there is a need to investigate the effect of different variables to the quality of instruction in BL environments. Hence, the current study aimed to understand the learning of pre-service teachers (PsT) and its relation to some variables; perceived satisfaction, collaboration, and social presence.

### **Literature review**

#### ***Satisfaction***

Satisfaction was defined as the fulfillment of a need or enjoyment derived from an activity (Bolliger & Erichsen, 2013). Student satisfaction was mentioned as one of the basic requirements for successful implementation of BL (Naaj et al., 2012) and stated as one of the strong predictors of learning outcomes such as engagement, retention, use of deep learning strategies, collaboration, social presence (Akyol & Garrison, 2011; Bolliger & Erichsen, 2013; LaPointe & Gunawardena, 2004; So & Brush, 2008). It was stated that the more learners are satisfied, the more they are expected to be successful and have higher graduation rates (Sorden, 2011). Also, satisfied students learn more easily, are less likely to drop out of class, more likely to take more BL courses, and also they recommend the course to others (Naaj, et al., 2012). However, if learners are not satisfied, the benefits mentioned previously might not be achieved. Moreover, it was thought that blending an Educational Sciences course may deepen the understanding of PsT about the course content by involving discussions outside of the class time and creating time for in-class activities, which in turn may affect their satisfaction positively. Also, PsT may observe and experience this pedagogical approach at firsthand and if they are satisfied in terms of their experiences, they may benefit from different instructional strategies including information and communication technologies in their future profession rather than depending on traditional presentations. For this reason, in this study, the satisfaction levels of PsT were investigated concerning collaboration, social presence, and learning in a BL environment.

#### ***Collaboration***

BL includes collaborative learning opportunities for learners who have different abilities and skills to increase their engagement in courses and facilitate interaction and group learning processes both in the F2F part of the course and among the group members who live in physically distant areas (So & Brush, 2008; Sorden, 2011; Yang et al., 2018). As stressed by social constructivist theorists, social interaction and collaboration are important in the learning process as a way to enhance the learning and satisfaction of students (Ferguson & DeFelice, 2010; LaPointe & Gunawardena, 2004; Nummenmaa & Nummenmaa, 2008; Patrick et al., 2007; So & Brush, 2008). Moreover, there is a large, direct effect of self-reported peer interaction on learning since collaboration among participants

supports them to become more active in their learning processes (LaPointe & Gunawardena, 2004). To put it another way, learners who perceive high levels of collaboration, are highly satisfied with the course activities, learn better and perceive high levels of social presence. Besides, increased support from classmates during collaborative activities in terms of feeling being cared both as a person and issues related to the course (Patrick et al., 2007) increases the perceived satisfaction and social presence of learners (So & Brush, 2008). By experiencing collaborative activities in a blended course, PsT may also include collaborative activities when they are teaching in real classroom environments in the future.

### *Social Presence*

Social presence is related to one's perceptions of the quality of interactions taken place in an online community in which participants develop trust relationship, are aware of the existence of other participants, feel that they belong to that community, interact with other learners and the instructor even when the physical contact is not available (Garrison et al., 2010; Picciano, 2002; Tu, 2002). Also, Tu and McIsaac (2002) explained that the increase in the number of posts at the online part of the blended course does not represent a high social presence, but familiarity with participants, interaction among them, and trust relationships influence social presence positively and learning as a consequence. Moreover, many researchers concurred that learning, satisfaction, collaboration and social presence are some of the important variables for effective instruction in BL environments and they are interconnected with each other (Picciano, 2002; Allred-Oyarzun, 2016; So & Brush, 2008; Sorden, 2011). It can be explained that if PsT feel that they learned the content, they may have more positive learning experiences and a strong sense of satisfaction towards the course as stated by Sorden (2011). As PsT satisfied in the course, they interact with others more about course tasks which increases perceived collaboration (LaPointe & Gunawardena, 2004). For this reason, PsT might perceive higher social presence as stated by Allred-Oyarzun (2016), which in turn increase their achievement.

In addition, students who were born between 1982 and 2005 were basically described as digitally literate and preferring active learning experiences enriched with technology since they were born into a world where technology is ubiquitous (Phillips & Trainor, 2014). Also, the Movement of Enhancing Opportunities and Improving Technology project in Turkey indicated the importance and necessity of integrating technology to instruction (Ocak, Gökcearslan, & Solmaz, 2014). Since students at K-12 schools are expected to learn through technology, it is necessary to develop PsT' awareness about the variables that should be taken into consideration in BL environments which include mostly text-based online part and has limited opportunities for some properties like intimacy and immediacy due to the lack of eye-contact and physical existence (Weaver, 2005). In this sense, the experiences of PsT about the perceived social presence in their teacher training courses is important to help their future students by observing the affordances and drawbacks of using emoticons, humor, addressing peers by name, use of personal examples, asking questions and answering others' posts, or praising each other's posts to increase social presence as stated by Pattison (2017) and Yamada & Goda (2012).

Moreover, So & Brush (2008) revealed that course structure, and communication medium are some of the critical factors associated with learning and perceptions of satisfaction, collaboration, and social presence. For these reasons, this study investigated the interaction of these variables in a BL environment designed according to 'Blending with Purpose' multimodal model.

This study aimed to investigate whether the perceived satisfaction, collaboration, and social presence of PsT predicted their achievement in a blended learning environment and differed significantly according to their gender and departments. In the current study, the possible gender and department differences in PsT's achievement, satisfaction, collaboration, and social presence were also investigated since it has been argued that females may be at a disadvantage in the online part of BL because they have lower experience or confidence in the use of computers (Johnson, 2011). Previous research has identified certain gender differences in terms of adoption of computer technologies such

as the ease of use (Nel & Raleting, 2012), team effectiveness (Dunaway, 2013), computer self-efficacy and perceived accomplishment and enjoyment (Dang et al., 2016). However, there is limited research investigating the gender and department differences in terms of achievement, perceived satisfaction, collaboration, and social presence of PsT (Dang et al., 2016; Gonzalez-Gomez et al., 2012). Based on the purposes of this study, the following research questions were proposed:

1) Is the scale developed in the current study valid and reliable to measure PsT's satisfaction, collaboration, and social presence levels?

2) How well satisfaction, collaboration, and social presence of PsT predict their achievement in an educational sciences course?

3) Do the satisfaction, collaboration, social presence and academic achievement levels of PsT differ significantly according to their gender and departments?

## METHOD

This case study (Fraenkel & Wallen, 2009) was conducted during the fall semester of 2019-2020 for six weeks at an educational sciences course in a public university in Turkey after obtaining the approval of the Human Subjects Ethics Committee.

### Participants

The participants which suited the purposes of the study were chosen according to the purposive sampling method mainly according to the convenience sampling method (Creswell, 2012). In this study, for the validity and the reliability studies of the Satisfaction, Collaboration and Social Presence Scale (SCSP) scale, 242 PsT were included. Among the 242 PsT, 155 (64%) of them were female and 87 (36%) of them were male and 90 of them took the BL course which included the same course topics and activities by the same instructor in the spring semester of 2018-2019 education year. The distribution of PsT across their departments can be seen in Table 1.

**Table 1. The distribution of participants across their departments**

Departments	f	%
Guidance and Psychological Counseling	44	18.2
Elementary School Mathematics Teaching	24	9.9
Turkish Language Teaching	114	47.1
Social Sciences Teaching	25	9.4
Classroom Teaching	35	14.5
Total	242	100

149 PsT (105 female, 44 male) were included in the second part of the study to investigate whether their perceptions in BL environment predicted their achievement and differed in terms of the perceptions of satisfaction, collaboration, and social presence according to their gender and departments. Among the PsT, 45 (30.2%) of them were from Psychological Counseling and Guidance Department; 21 (14.1%) of them were from Elementary School Mathematics Teaching Department; 23 (15.4%) of them were from Turkish Language Teaching Department; 27 (18.1%) of them were from Social Sciences Teaching Department and 33 (7.9%) of them were from Elementary Education Classroom Teaching Department.

### Data Collection Instruments

In this study, data were collected through the application of the SCSP scale. According to literature, researchers have appealed to course grades to compare the effectiveness of instruction (Akyol & Garrison, 2011). Hence, in the current study, the course grades of PsT were evaluated as the achievement scores of them, which varied from 0 to 100. The course content included the planning of

instruction, basics of curriculum development, needs assessment techniques, content organization, variables for the effective teaching-learning process, curriculum evaluation types.

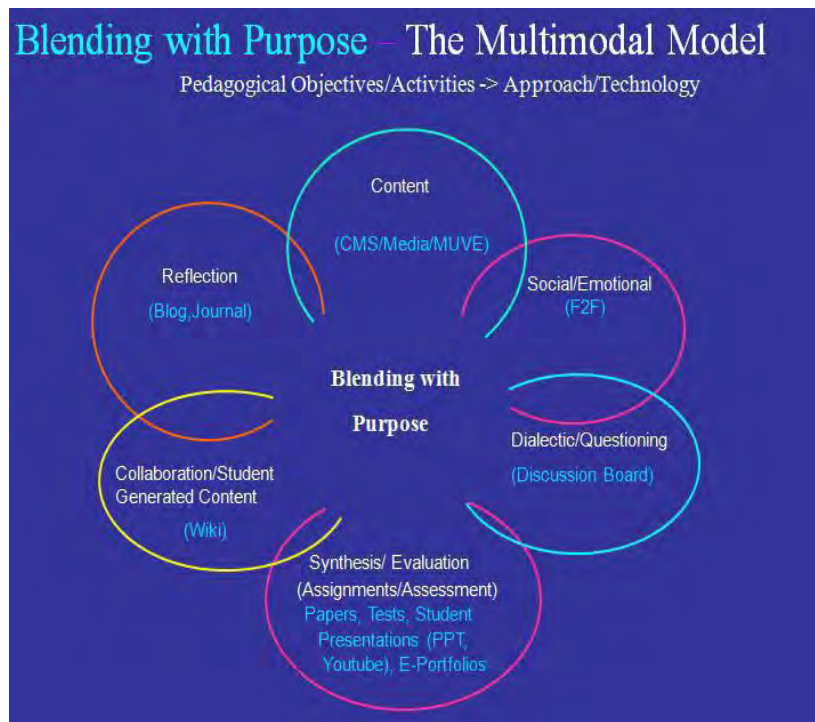
### ***Satisfaction, Collaboration and Social Presence Scale (SCSP)***

In this study, ‘the Satisfaction, Collaboration, and Social Presence Scale (SCSP)’ Scale was developed by the researcher. Firstly, a thorough literature review was conducted to determine scale items. In this sense, many instruments across various grade levels, subjects, and different classroom contexts such as online or blended were investigated (Picciano, 2002; So & Brush, 2008; Tu, 2002) and a total of 47 items was written in Turkish by adapting some items from these instruments as well as writing new items. As a result, a draft form was prepared and presented to the expert opinion. The experts were asked for making analyzes and recommendations about the coincidence of items to the factors, their meaning, and clarity. Besides, the suggestions of experts for adding new items, the grammar of sentences, face validity, and length of administration were obtained as also suggested by Worthington and Whittaker (2006). As a result, some items were omitted and some items were rephrased. Also, the SCSP scale was applied to five PsT to review the instrument in terms of clarity and readability of items and instructions. The final form consisted of 35 items 5-point Likert-type scale which is changed from certainly agree (5) to completely disagree (1). The scale included three factors; eight items for Satisfaction, nine items for Collaboration, and 18 items for Social Presence.

This study included PsT who learned the course through BL, using a Learning Management System (LMS) such as Edmodo. Hence, the data collection process took a long time in terms of reaching as many PsT as possible to conduct the analysis and started in the 2018-2019 education year spring semester and was completed at the end of 2019-2020 education year fall semester. PsT needed around 20 minutes to fill out the scale.

### **Data Collection Procedures**

In the current study, the course design was based on the “Blending with Purpose” multimodal model. This is a flexible model and is based on BL technology, social learning theory and cognitive science including theories related to personality types and learning styles (Picciano, 2009).



**Figure 1.** The multimodal model for blending with purpose (Picciano, 2009, p. 15)

As shown in Figure 1, this model included pedagogical objectives of the course, content, questioning part about course topics, F2F and online collaboration, online reflection, synthesizing, evaluating, and assessing learning. Also, this model integrated different learning approaches and technologies for effective learning. According to this model, every course does not need to include online discussion activities or jigsaw groups if there is no specific pedagogical objective to conduct them as stated by Picciano (2009).

In the current study, the content was delivered in the F2F part of the course by using technologies like PowerPoint slides and YouTube videos related to course topics. Oral question-answer sections in the F2F part of the course was conducted to check learning of PsT. Moreover, PsT interacted with each other and the instructor in collaborative group studies, so they could obtain social, cognitive, and emotional support to foster their satisfaction, collaboration, and social presence of the course.

As underlined by Han (2013), involvement in course activities cognitively, posting ideas on the discussion board fosters social presence. For this reason, to establish a strong social presence even in the online part of the course, an online discussion board Edmodo (LMS) was designed as a rich communication and interaction method. In this way, PsT conducted asynchronous discussions collaboratively to refine their understanding of the content in the online part of the course. During asynchronous online discussions, PsT were asked to share their ideas and the points they agreed or opposed by stating the reasons based on the literature to reinforce their learning. Through these online discussions, PsT had the opportunity to talk and discuss various topics in relation to the content of the course. In this way, it was aimed that PsT could think critically about the discussion topic cases and reflect on them.

Moreover, the synthesis, evaluation, and assessment of learning part included Kahoot plays to evaluate the learning of PsT at the end of F2F part of the course besides the group studies which were conducted to discuss course topics or to prepare a sample lesson plan which included the topics of the course (Writing the objectives of the course, content organization, instructional activities, and evaluation part). The instructor was able to observe the learning of PsT both in F2F and online parts of the course and corrected any misunderstanding about the course topics.

### **Data Analysis**

In this study 'Exploratory Factor Analysis' (EFA) and 'Confirmatory Factor Analysis' (CFA) were conducted to answer the first research question and to check the construct validity of the scale. For EFA, oblique rotation, Promax method was used (Raubenheimer, 2004; Worthington & Whittaker, 2006) since according to pre-mentioned literature, a high level of inter-item correlation was assumed among the factors 'Satisfaction', 'Collaboration', and 'Social Presence'. The Principle Axis Factoring (PAF) extraction method was employed since the multivariate normality was violated according to Mardia's test results (Field, 2009).

Having checked the assumptions, EFA was performed (Field, 2009; Tabachnick & Fidell, 2007; Yong & Pearce, 2013). While determining the number of factors, the factors with eigenvalues greater than one were considered and the scree plot was checked (Field, 2009; Hair et al., 2014; Worthington & Whittaker, 2006). Then CFA was conducted to validate the factor structure of the model derived from the results of EFA by using AMOS 24.0 (Yong & Pearce, 2013; Worthington & Whittaker, 2006). Finally, Cronbach's Alpha coefficients of internal consistency were examined to test the reliability of the scale.

In order to answer the second research question and to predict the achievement of PsT in an educational sciences course, Multiple Linear Regression (MLR) procedures were employed (Tabachnick & Fidell, 2007). The satisfaction, collaboration, and social presence dimensions of the SCSP Scale were analysed together to determine whether they predicted the achievement of PsT. For this reason, the assumptions of MLR were also checked to ensure that there was no violation of

linearity, normality, multicollinearity, the influential observations, and homoscedasticity (Field, 2009; Tabachnick & Fidell, 2007).

In order to answer the third research question, Multivariate Analysis of Variance, MANOVA, was employed after checking and confirming that there is no violation of assumptions (Tabachnick & Fidell, 2007). The homogeneity of the covariance assumption was violated since the result of Box's *M* test was significant, Box's  $M= 148.66$ ,  $F(80, 4133.01) = 1.55$ ,  $p < .05$  (Tabachnick & Fidell, 2007) beside the violation of the multivariate normality assumption. For these reasons, Pillai's Trace values were reported (Pillai's Trace = 0.99) to check the significance of the MANOVA model  $F(4, 136) = 2785.13$ ,  $p < .00$ . Data analyses were conducted using SPSS 22 and the significance of the alpha level was selected at the cut-off value .05 (Tabachnick & Fidell, 2007).

## Results

In this part of the study, firstly, findings related to the validity and reliability of the SCSP Scale were presented. Then the findings of the remaining research questions were presented.

### *Results Related to the Validity and Reliability of the SCSP Scale*

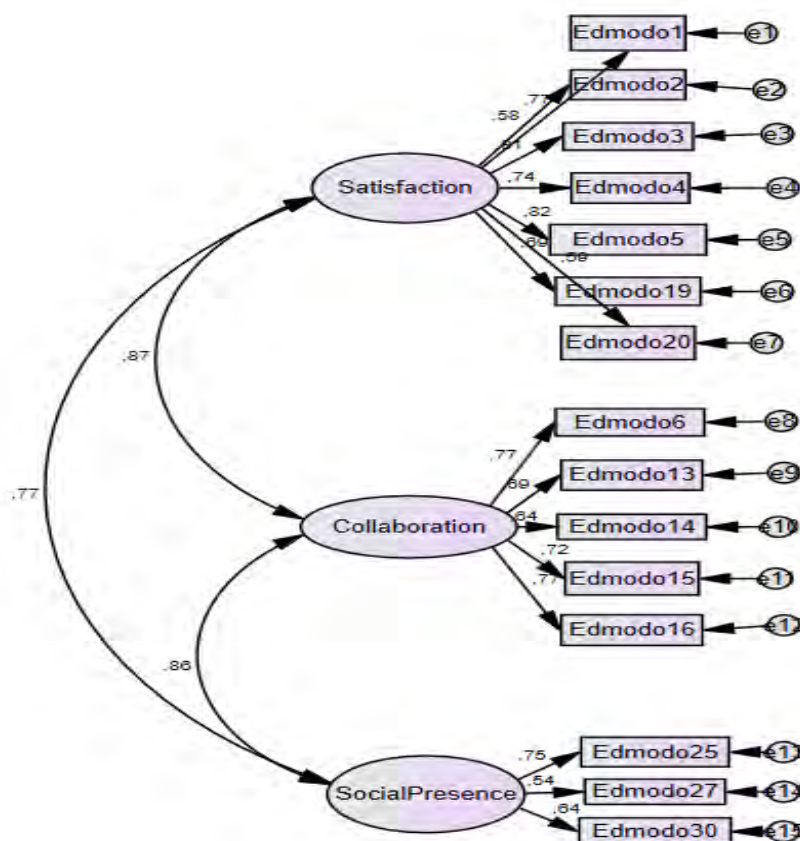
The EFA was conducted to ensure the validity of the SCSP scale. When the pattern matrix of the SCSP Scale was checked, some items were removed from the scale one by one because of having factor loadings less than 0.30, cross-loading on multiple factors which was less than .15 difference from an item's highest factor loading and forming a 2-item factor (Field, 2009; Tabachnick & Fidell, 2007; Yoo & Donthu, 2001; Worthington & Whittaker, 2006). The remaining items significantly contributed to the corresponding factor as they were statistically significant at  $p = .001$  level (see Appendix 1 for the remaining items). According to the last analysis, three eigenvalues were found higher than one and they explained 59.58% variance. The results of the EFA was shown in Table 2.

**Table 2. The results related to validity and reliability of the SCSP scale**

Factors	Number of Items	Cronbach's Alpha	Variance explained (%)	Cumulative Variance (%)	Eigenvalues	Factor loadings
Satisfaction	7	.88	45.25	45.25	7.24	.84, .80, .65, .64, .63, .55, .51
Cooperation	5	.84	7.81	53.06	1.25	.86, .76, .65, .56, .46
Social Presence	4	.69	6.52	59.58	1.04	.65, .51, .35, .34

KMO= .93; Barlett's Test of Sphericity  $\chi^2(120) = 1832.78$ ;  $p = .00$

Moreover, according to CFA, the chi-square value was found ( $\chi^2/df = 189.53/87 = 2.18$ ;  $p = .000$ ). To improve the fit index values of the model, item 23 was removed from the model because of the low estimate value. CFA revealed the following fit indices:  $CFI = .94$ ;  $NFI = .90$ ;  $RFI = .88$ ;  $IFI = .94$  and  $RMSEA = .07$ . Therefore, it can be said that the model is acceptable (Hair et al., 2014; Tabachnick & Fidell, 2007). Figure 2 showed the three-factor 15-items model of the scale with its standardized path coefficients. The standardized path coefficients ranged from .54 for item 27 to .82 for item 5.



**Figure 2.** Standardized path coefficients for the three-factor model of SCSP scale

**Results Regarding the Prediction of Achievement of PsT from the Factors of SCSP Scale**

Firstly, the means, standard deviations, and correlations related to predictor and outcome variables were shown in Table 3.

**Table 3. The correlations among academic achievement and predictor variables**

	Academic Achievement (1)	Satisfaction (2)	Collaboration (3)	Social Presence (4)
(1)	1.00			
(2)	.24**	1.00		
(3)	.14*	.74**	1.00	
(4)	.17*	.59**	.61**	1.00
M	72.30	27.20	19.15	11.45
SD	9.37	4.54	3.52	1.93

\*  $p < .05$ , \*\*  $p < .00$

According to Table 3, the correlations among academic achievement and predictor variables changed between  $r = .14$  and  $r = .24$ . The highest correlation was between satisfaction and collaboration ( $r = .74$ ). It can be inferred that when PsT collaborated with their peers more, they are satisfied in the course. Also, satisfaction and academic achievement of PsT correlated significantly in a positive direction ( $r = .24$ ). It can be said that as PsT were satisfied in the course, they obtained higher grades. Additionally, PsT who perceived higher social presence, satisfied ( $r = .59$ ) in the course, and collaborated with their peers more ( $r = .61$ ).



In this study, the outcome variable was the academic achievement, while the satisfaction, collaboration, and social presence variables were predictor variables. The predictor variables were entered into the model as shown in Table 4 to test whether the model is significantly better at predicting the academic achievement of PsT.

**Table 4. Summary of the MLR analyses for variables predicting the academic achievement**

Predictor Variables	B	SE B	$\beta$	t	$Sr^2$	$R^2$	$\Delta R^2$	$\Delta F$
Model						.06**	.06**	3.16**
Constant	58.22	5.12		11.38**				
Satisfaction	.54	.26	.26	2.11*	.17			
Collaboration	-.27	.33	-.10	-.79	-.06			
Social Presence	.39	.51	.08	.77	.06			

\*  $p < .05$ , \*\*  $p < .00$

When the F-ratio shown in Table 4 was checked, it was found that  $F(3, 145) = 3.16$  ( $p < .05$ ). It can be said that the model was significant in predicting the outcome variable (Field, 2009). The model explained 6% of the variance in academic achievement. In other words, the satisfaction, collaboration, and social presence variables explained 6% of the variance in academic achievement. When the  $t$ -statistics were checked to control whether the predictor variables contributing to the model significantly (Field, 2009), the results can be seen in Table 4 that only the satisfaction of PsT  $t(145) = 2.11$ ,  $p < .05$  significantly predicted their achievement and if all other variables were held constant, satisfaction would predict the 17% of the variance of the achievement of PsT.

#### 4.3. Results Regarding the Perceptions of PsT's Satisfaction, Collaboration, and Social Presence according to their Gender and Departments

Before the presentation of MANOVA results, descriptive statistics concerning all variables were shown in Table 5.

**Table 5. Mean scores and standard deviations for achievement and predictor variables**

Departments	Gender	Achievement		Satisfaction		Collaboration		Social Presence		N
		M	SD	M	SD	M	SD	M	SD	
PCG	F	79.27	5.94	28.90	2.84	20.10	2.83	11.80	1.54	30
	M	70.40	7.88	28.13	5.26	18.27	2.25	12.13	1.88	15
Total PCG		76.31	7.80	28.64	3.79	19.49	2.77	11.91	1.65	45
EMT	F	75.53	7.66	27.82	3.76	19.71	2.36	11.18	2.01	17
	M	76.00	7.07	22.50	2.38	18.00	2.45	11.25	.50	4
Total EMT		75.62	7.38	26.81	4.09	19.38	2.42	11.19	1.81	21
TLT	F	66.86	7.87	27.21	5.71	19.14	4.64	11.21	2.12	14
	M	60.78	5.74	26.56	4.22	19.44	3.91	11.78	1.09	9
Total TLT		64.48	7.60	26.96	5.09	19.26	4.28	11.43	1.78	23
SST	F	68.81	8.29	26.00	3.71	18.94	2.43	10.56	2.00	16
	M	64.00	6.81	24.82	6.05	17.55	5.96	10.18	3.16	11
Total SST		66.85	7.96	25.52	4.73	18.37	4.19	10.41	2.48	27
CT	F	75.71	8.93	27.29	4.56	18.75	4.02	11.71	1.78	28
	M	68.40	12.12	25.60	6.80	21.00	3.16	12.60	.89	5
Total CT		74.61	9.63	27.03	4.87	19.09	3.95	11.85	1.70	33
Female Total	F	74.47	8.79	27.63	4.10	19.37	3.34	11.41	1.85	105
Male Total	M	67.11	8.74	26.18	5.35	18.61	3.91	11.55	2.13	44
Total		72.30	9.37	27.20	4.54	19.15	3.52	11.45	1.93	149

\* (PCG) stands for Psychological Counseling and Guidance Department; (EMT) stands for Elementary School Mathematics Teaching Department; (TLT) stands for the Turkish Language Teaching Department; (SST) stands for Social Sciences Teaching Department and (CT) stands for Classroom Teaching Department.

As shown in Table 5, the descriptive analysis revealed the highest academic achievement obtained by the female PsT studying at the Psychological Counseling and Guidance Department ( $M = 79.27, SD = 5.94$ ), the lowest academic achievement obtained by the male PsT studying at the Turkish Language Teaching Department ( $M = 60.78, SD = 5.74$ ). Moreover, while female PsT who were in the PCG were satisfied most ( $M = 28.90, SD = 2.84$ ), male PsT who were in the Social Sciences Teaching Department were satisfied least ( $M = 24.82, SD = 6.05$ ). For collaboration, male PsT who were in Classroom Teaching Department obtained highest mean scores ( $M = 21.00, SD = 3.16$ ), male PsT who were in Social Sciences Teaching Department obtained lowest mean scores ( $M = 17.55, SD = 5.96$ ). In terms of social presence, male PsT who were in the Classroom Teaching Department obtained the highest mean scores ( $M = 12.60, SD = 0.89$ ), those who were in Social Sciences Teaching Department obtained lowest mean scores ( $M = 10.18, SD = 3.16$ ).

In this study, MANOVA was run to find out if the PsT's perceptions of satisfaction, collaboration, and social presence differ according to their gender and departments (Tabachnick & Fidell, 2007). The results for MANOVA were shown in Table 6.

**Table 6. Multivariate and univariate analyses of variance for the perceptions of PsT's satisfaction, collaboration, and social presence according to their gender and departments**

Variable	MANOVA**	ANOVA**F (1,139)			
	F (4,136)	Achievement	Satisfaction	Collaboration	Social Presence
Gender	5.51**	12.10**	4.76	.46	.62
Department	4.06**	10.75**	2.59	.62	3.49*
Gender *	1.43	.98	.72	1.23	.35
Department					

\*\*p < .00, \*p < .012

As shown in Table 6, the interaction between 'gender' and 'department' was found insignificant,  $F(16, 556) = 1.43, p = .12$ . Among the independent variables, gender ( $F(4, 136) = 5.51, p = .00$ ) and the department ( $F(16, 556) = 4.06, p = .00$ ) had significant effect on the dependent variables. While the alpha level for academic achievement, satisfaction, social presence was determined as  $(.05/4 = .012)$  due to the Bonferroni correction.

According to the results, it was seen that the gender had a significant effect on achievement  $F(1, 139) = 12.10, p < .00, \eta^2 = .08$ . However, the perceptions of satisfaction of PsT did not significantly differ according to their gender,  $F(1, 139) = 4.76, p = .03$ , collaboration  $F(1, 139) = .46, p = .50$  and social presence  $F(1, 139) = .62, p = .43$ . Moreover, it can be seen in Table 6 that the department had a significant effect on achievement  $F(4, 139) = 10.75, p < .00, \eta^2 = .24$  and social presence  $F(4, 139) = 3.49, p < .00, \eta^2 = .09$ . However, the perceptions PsT did not significantly differ from each other based on their departments in terms of satisfaction,  $F(4, 139) = 2.59, p = .04$  and collaboration  $F(4, 139) = .62, p = .65$ .

When multiple comparisons were conducted, it was found that female PsT obtained significantly higher achievement ( $M = 74.47, SD = 8.79$ ) scores than males ( $M = 67.11, SD = 8.75$ ). In addition, although female PsT obtained higher satisfaction ( $M = 27.63, SD = 4.10$ ), and collaboration ( $M = 19.37, SD = 3.34$ ) scores than male PsT which were ( $M = 26.18, SD = 5.35$ ) for satisfaction and ( $M = 18.61, SD = 3.91$ ) for collaboration, they were not statistically significant. However, male PsT obtained slightly higher social presence scores ( $M = 11.55, SD = 2.13$ ) than female PsT ( $M = 11.41, SD = 1.85$ ).

In terms of the effect of the department on PsT's achievement, PsT in the Psychological Counseling and Guidance ( $M = 76.31, SD = 7.80$ ), Elementary School Mathematics Teaching ( $M = 75.62, SD = 7.38$ ), and Classroom Teaching Department ( $M = 74.61, SD = 9.37$ ) obtained significantly higher grades than those in the Social Sciences Teaching Department ( $M = 66.85, SD = 7.95$ ) and Turkish Language Teaching Department ( $M = 64.48, SD = 7.60$ ). In terms of the effect of department on social presence, PsT in the Psychological Counseling and Guidance Department ( $M = 11.91, SD =$

1.65) and Classroom Teaching Department ( $M = 11.85$ ,  $SD = 1.70$ ) perceived significantly higher social presence scores than those in the Social Sciences Teaching Department ( $M = 10.41$ ,  $SD = 2.48$ ).

## DISCUSSION

In this part, the findings of the study were discussed in detail. Firstly, the findings related to the validity and reliability of the SCSP scale were discussed, then the findings obtained from the implementation of this scale were discussed.

### *Discussions Related to the Validity and Reliability of the SCSP Scale*

The current study aimed to develop and validate the SCSP scale to be used to investigate the perceptions of PsT in BL environments. SCSP scale included 'Satisfaction', 'Collaboration', and 'Social Presence' factors. These factors accounted for 59% of the total variance of the scale. While the first factor accounted for 42.25% of the total variance, the other two factors accounted for 7.81% and 6.52% of the total variance respectively. The satisfaction factor contained seven items, collaboration contained five items and social presence contained three items.

It can be considered as incorrect to identify a factor with three items; however, many researchers stated the construct validity as an important property for deciding the number of items. Raubenheimer (2004) stated that a minimum of three items must load significantly on each factor in a multidimensional scale to identify all subscales and stressed that as the more items are added per factor, the more likely the items of that factor will replicate. For instance, The SITEQUAL scale developed by Yoo & Donthu (2001) has four dimensions (ease of use (2 items), aesthetic design (3 items), processing speed (2 items), and security (2 items) and only nine items, which were considered as both parsimonious and showed acceptable psychometric properties as in the current study.

In addition, So and Brush (2008) included the questionnaire developed by Tu (2002) to measure the perceptions of social presence which was based on four factors (social context, online communication, interactivity, and privacy). In the current study, PsT could not discriminate items related to social context and privacy clearly, or the items of these sub-factors were loaded less, and this has resulted in their elimination from the SCSP scale. Similarly, Tu (2002) found a significant but weak correlation between privacy and social presence and expressed that it may vary with different subjects, media, and contexts. For this reason, in this blended educational course items like 'Posting ideas on Edmodo was impersonal (item 23)', 'Posting on Edmodo is confidential (item 24)', and 'Posting on Edmodo is technically reliable (item 29)' were eliminated from the social presence factor. Similarly, items related to social context were also eliminated from the scale such as 'The place where I access Edmodo (home, office, computer labs, public areas, etc.) does not affect my desire to participate'.

Furthermore, as stated by Yong and Pearce, (2013, p. 80) factors including fewer variables are considered as reliable when the variables are highly correlated with each other; however, in the current study, correlations among factors changed between  $r = .59$  and  $r = .74$ . The reliability coefficients for the 15-item SCSP scale were found .88, .84 and .69 for the satisfaction, collaboration, and the social presence factors respectively. While Clark and Watson (1995) stated that researchers accepted reliabilities in the .60s and .70s as good or adequate, according to Hair et al. (2014), reliability should be 0.70 or higher to indicate internal consistency, which is quite close to this point for the social presence scale. All in all, the scale implemented in the current study is thought to be valid and reliable.

### *Discussions Related to the Prediction of PsT's Achievement from Satisfaction, Collaboration, and Social Presence Variables*

This study revealed that satisfaction, collaboration, and social presence in the BL environment correlated significantly in a positive direction, which was corroborated in many studies in different courses (Allred-Oyarzun, 2016; Ferguson & DeFelice, 2010; LaPointe & Gunawardena, 2004; So &

Brush, 2008; Sorden, 2011; Tu & McIssac, 2002). However, only the satisfaction of PsT in the course of educational sciences predicted their academic achievement, which is in line with the literature (Dang et al., 2016; Weaver, 2005). The course activities, the flexibility of conducting tasks, online system, and interaction among peers and instructor might have influenced the satisfaction of PsT as also stated by Dang et al. (2016) which might be related to student persistence and course completion as also stated by Weaver (2005).

In the current study, the collaboration of PsT did not predict their achievement. This finding has been contrasted with the results of some studies, which expressed the collaborative learning environment as an important component for promoting learning, student performance, and increasing satisfaction (Allred-Oyarzun, 2016; Ferguson, & DeFelice, 2010). The reason for the result obtained in the current study might have stemmed from the course design. In this blended course, PsT might have felt the need to make more effort to get familiar with the course content, research on the internet alone, and reflect their own ideas. Moreover, some of the PsT might be passive during group tasks. For this reason, it is suggested that instructors should monitor continuously and be careful in terms of students' relying too much on others during group studies conducted in-class.

In the current study, the social presence of PsT did not predict their achievement. This finding of the current study has been contrasted with the results of many studies in which social presence was found as a significant predictor of perceived learning and satisfaction of students (Allred-Oyarzun, 2016; Sorden, 2011). This reason for this result might be that in this blended course, PsT did not feel the lack of safety, trust, respect, rapport, and interdependence due to F2F class time, where the instructor existed and fostered these feelings, which were also stressed in many studies (Pattison, 2017; Yamada & Goda, 2012). As stated by Akyol and Garrison (2011) the F2F component of this blended course might have decreased the need for expression of emotions, use of humour, and self-disclosure to establish intimacy in the online part, which might have affected the perceived social presence of PsT.

#### ***Discussions Related to the Perceptions of PsT's Satisfaction, Collaboration, and Social Presence according to their Gender and Departments***

In the current study, it was found that female PsT obtained higher satisfaction collaboration scores and significantly higher achievement scores than male PsT. Different from the current study, Dang et al. (2016) did not find a gender difference in terms of satisfaction. By confirming the current study, the findings of Gonzalez-Gomez et al. (2012) found significant differences in favor of female students regarding their satisfaction in an online learning environment about the teaching methods and planning including 1.185 learners from 27 courses. The reason for the result of the current study might be that males are generally more confident about their computer knowledge and ability, which might have led to less commitment and less effort during the learning process. Another reason might be that females might have attached more importance to active participation and learning as well as valuing interaction with peers and the instructor at a higher degree compared to the males as also stated by Johnson (2011), which in turn might have affected their achievement in the course besides increasing their satisfaction and collaboration scores. In addition, male PsT obtained slightly higher social presence scores than female PsT. In this sense, one possible explanation might be that as male PsT are less than females in number, social presence might be an external stimulus for them in terms of fostering trust to share their posts on Edmodo.

Also, this study revealed that PsT in PCG, Elementary School Mathematics Teaching Department, and Classroom Teaching Departments obtained higher achievement, and satisfaction scores than those in the Social Sciences Teaching Department and Turkish Language Teaching Departments. Moreover, PsT in the PCG, and Classroom Teaching Department perceived significantly higher social presence scores than those in the Social Sciences Teaching Department. The reason for this findings might have resulted from the fact that PsT who were in PCG, Elementary School Mathematics Teaching, and Classroom Teaching Departments generally ranked higher according to University Placement Exam in Turkey. Similarly, Ramsden and Entwistle (1981) revealed the

correlation between university admission grades and academic progress. It may be inferred that PsT who were in PCG, Elementary School Mathematics Teaching and Classroom Teaching Departments are more focused on reflecting their ideas and critically evaluating the given information as the nature of the courses such as mathematics, physics, etc. they have taken compared to those in Social Sciences Teaching Department and Turkish Language Teaching Departments. For this reason, their achievement was higher so were their perceived satisfaction, collaboration and social presence which is in line with the literature (Allred-Oyarzun, 2016; Dang et al., 2016; Ferguson & DeFelice, 2010; LaPointe & Gunawardena, 2004; So & Brush, 2008; Sorden, 2011; Tu & McIssac, 2002; Weaver, 2005).

### ***Limitations and Future Research***

In the current study, findings showed that there were significant correlations among learner satisfaction, collaboration, social presence and learning in this blended course, and it may help curriculum designers, policymakers and institutions to advocate these features, take them into consideration to better meet the needs of PsT and foster more effective learning environments in teacher training institutions.

Also, female PsT obtained significantly higher achievement scores than male PsT. For this reason, it may be suggested for instructors to foster males in terms of their commitment and hard work instead of just relying on perceived computer proficiency as also suggested by Dang et al. (2016).

In the current study, the achievement of PsT was predicted by satisfaction; however, achievement may also be related to other factors besides the ones investigated in the current study such as learners' self and autonomous learning abilities or being accustomed to learning through technology, which may affect satisfaction. Hence, future research may include these variables in predicting achievement. In this study, the achievement of PsT was determined according to the final exam. Future research may also investigate the outcomes of PsT according to the quality and the type of their contributions to Edmodo, collaborative assignments, and interaction among peers. Finally, future research may investigate the learning of PsT through differently designed blended courses such as involving group projects or wikis since the design may affect the satisfaction, collaboration and perceived social presence of PsT differently.

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## **Appendix 1.**

### **Satisfaction**

1. I was able to learn something from the discussions conducted on Edmodo
2. The topics discussed on Edmodo encouraged me to do additional reading or research.
3. Discussions on Edmodo helped me to understand others' points of view.
4. As a result of my experience in this course, I would like to take different lessons including online discussions in the future.
5. It was a useful learning experience for me to participate in Edmodo discussions.
19. Overall, I am happy with the co-learning experiences in this course.
20. Edmodo discussions are an efficient way of social communication.

### **Collaboration**

6. The variety of discussion topics on Edmodo encouraged me to participate in the discussions.
13. I felt I was part of a learning community in Edmodo discussions.
14. I actively shared my ideas with peers in Edmodo discussions.
15. In Edmodo discussions, I was able to learn new knowledge and skills from other members.
16. I was able to develop problem-solving skills through peer collaboration.

### **Social Presence**

25. The language and the attitudes of peers in Edmodo discussions are encouraging.
27. The explanations of peers in Edmodo's discussions are easy to understand.
30. Edmodo discussions allow relationships based on information sharing and transmission.