



Developing a “Social Presence Scale” for E-learning Environments

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Abstract

The purpose of the current study is to develop a “social presence scale” for e-learning environments. A systematic approach was followed for developing the scale. The scale was applied to 461 students registered in seven different programs at Gazi University. The sample was split into two subsamples on a random basis (n1=261; n2=200). The first sample was used for Exploratory Factor Analysis, and the second sample for Confirmatory Factor Analysis. After the Exploratory Factor Analysis, the scale included 17 items and three factors. These factors were labeled as interactive, cohesive, and affective in light of the relevant literature. The Cronbach’s alpha coefficient for the whole scale was found to be .84, whereas the values of Cronbach’s alpha coefficient for individual factors of the scale ranged between .75 and .81. The Confirmatory Factor Analysis was conducted within the scope of the validity study of the scale confirming the structure of the 3-factor scale. The findings of the study revealed that the scale was a valid and reliable instrument for measuring social presence.

Key Words

Affective, Cohesive, E-learning, Interactive, Social Presence, Scale Development.

There have been various studies on developing the efficiency of the e-learning environment, as these environments have become more prevalent in recent years (O’Neil, 2008; Reiser & Dempsey, 2012). Despite the benefits of education in these environments, the communication problem due to physical separation of the tutor and the learner is one of the main issues discussed in the literature. In order to overcome this problem and to ease learners’ communication with others,

e-learning environments are enriched with social communication tools (Sung & Mayer, 2012).

Because of the fact that social presence is a problematic term, it is described in various ways by different researchers (Annand, 2011; Cui, Lockee, & Meng, 2012). Short, Williams, and Christie (1976) define social presence as the salience of the other in mediated communication and the consequent salience of their inter-personal interactions. Gunawardena and Zittle (1997) describe it as

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the degree to which a person is perceived as a real person in mediated communication, while McLellan (1999) claims it is the feeling of presence with others in a social context. Tu (2000) argues that it is the extent of individuals' awareness; on the other hand, Leh (2001) describes it as the individual's feeling himself in the context of social terms. Additionally, Whiteman (2002) defines it as a feeling of involved other participants in the communication process. It is also believed to be the perception of participants as real individuals (Kreijns, 2004) and the perception of being together with others in e-learning contexts (Biocca, Harms, & Burgoon, 2003). Research related to social presence highlights the importance of its perception in e-learning contexts (Kim, Know, & Cho, 2011; Zhan & Mei, 2013). Moreover, this research emphasizes the effect of social presence on certain features, such as learners' success (Russo & Benson, 2005; Zhan & Mei, 2013), satisfaction (Gunawardena & Zittle, 1997; Richardson & Swan, 2003; So & Brush, 2008; Zhan & Mei, 2013), and performance (Lomicka & Lord, 2007; Richardson & Swan, 2003). According to Gunawardena (1995), social presence is necessary to increase the effect of education in face-to-face and e-learning environments. On the other hand, Aragon (2003) states that the main aim of creating the perception of social presence is to provide a flexible environment for other participants, so that participants can explain themselves better. The increase of social presence perception in e-learning contexts allows individuals to participate more eagerly (Rourke, Anderson, Garrison, & Archer, 1999), and to share their experiences more easily (Newberry, 2001). According to Rourke et al. (1999), another benefit of social presence perception is to support cognitive and affective learning aims. If e-learning environments are deprived of social presence perception, certain problems may arise, such as participants not being able to get accustomed to the context (Leh, 2001), or not being able to explain themselves easily (Gunawardena, Carabaja, & Lowe, 2001). As a result, it is argued that there is a decrease in the extent of the information shared (Leh, 2001). Furthermore, the deficiency of the social presence perception may cause high disappointment among learners and the decrease of affective learning (Hughes, Ventura, & Dando, 2007).

There are various social presence scale studies developed by different researchers in the literature (Kang, Choi, & Park, 2007; Kim, 2011; Short et al., 1976; Tu, 2002). However, there is no common view

regarding how social presence should be measured; some of the scales measure it in a context-bound way, while others measure it context-free.

In scale development studies, it is necessary to clearly define the feature to be measured, and to explain the indicators explicitly. Therefore, in this study, a scale is developed to diagnose social presence perception in e-learning environments by considering indicators developed by Hughes et al. (2007), as well as definitions related to each indicator. Although there are some international scale studies related to social presence, not many of them pertain to Turkey, except scale adaptation studies by Olpak and Kılıç-Çakmak (2009). In definitions of social presence, it is stated that the affective factor is important. However, it is clear that the affective factor is not mentioned sufficiently in the available social presence studies. Therefore, a new scale that includes the affective factor in addition to other factors is developed here.

Method

Participants

The participants of this study were 461 learners registered in seven different distance education department at Gazi University. 55.5% of the participants were male ($n=256$) while 44.5% of them were female ($n=205$).

Developing the scale

During the first phase of scale development, the literature was reviewed in a search for what various indicators could reveal about social presence. Social presence indicators and descriptions encoded by Rourke et al. (1999) and revised by Hughes et al. (2007) were taken into account while developing the scale. A pool with 32 items was made by considering each revised indicator related to social presence. The form that emerged was analyzed and evaluated by four experts in the Computer Education and Instructional Technologies department, one expert from Educational Sciences, and one expert from the Turkish Language Education department. In line with the views of these experts, the concept validity of these items was determined using concept validity rates developed by Veneziano and Hooper (1997). According to the rates of concept validity, two items were removed from the scale and some adjustments were made on certain items, resulting finally in a 5 likert type form with 30 items.

Data Collection

The scale form was sent via e-mail to all learners (n=1720) studying in distance education programs at Gazi University. Data collection lasted two months. During this process, a total of 512 learners filled out the form.

Data Analysis

Before the start of data collection, extreme, outlier, missing, or wrong values were corrected. At the end of this, validity and reliability studies were performed as a result of the answers received from the 461 learners. In this study, participants were divided into two groups randomly ($n_1=261$; $n_2=200$) due to timing and financial issues. Exploratory Factor Analysis (EFA) was performed on the first group, while Confirmatory Factor Analysis (CFA) was performed on the other group.

Results

Findings Related to Validity

In the literature, sample size is required to be five to ten times the number of items on a scale (Kass & Tinsley, 1979; Kline, 1994; Pett, Lackey, & Sullivan, 2003; Tavşancıl, 2005). Considering this criterion, EFA was performed on 261 learners.

Before the start of EFA, the KMO coefficient was calculated and the Barlett Sphericity test was performed to determine the aptitude of the data. The KMO value was found to be .81. Kaiser (1974) states that if the KMO value is higher than 0.5, a factor analysis can be performed. Pallant (2001) recommends that the KMO value be higher than 0.6, and the calculated KMO value (.81) in this study was higher than that. As a result of the analysis carried out at the end of the study, the Barlett test was found to be significant ($\chi^2=1393.460$; $p=0.00$). Data from the trial form of the scale was determined to be appropriate for performing a factor analysis.

All items with a factor loading above 0.4 were included (DeVellis, 2003; Field, 2005) whereas all items with factor loading lower than 0.4 were removed. According to the result of the EFA, the first extent factor consisted of seven items ranging from .46 to .69, the second extent factor load consisted of five items ranging from .59 to .79, and the third extent factor load consisted of five items ranging from .53 to .74. Whole factors explained 51.40% of the total variance. The first factor explained 18.45% of the total variance and was labeled "interaction."

The second factor explained 18.16% of the total variance and was labeled "ownership." The third factor explained 14.79% of the total variance and was labeled "affective statements." For the indices of cohesiveness of the model, the χ^2/df value was 2.17. The literature indicates that there is a perfect match in models where this value is under 2.5 for small samples (Kline, 2005). The RMSEA value was found to be 0.7, and according to Brown (2006) and Jöreskog and Sörbom (1993), this value indicates a good cohesiveness. The CFI and NFI values were .95 and higher, showing a perfect cohesiveness (Sümer, 2000; Thompson, 2004). The SRMR value also had a perfect match at .06 (Brown, 2006; Byrne, 1994). Given the fact that the GFI and AGFI were equal to or higher than 0.90, and that .85 and above for GFI and 0.80 and above for AGFI are thought to reflect a reasonable cohesiveness (Jöreskog & Sörbom, 1993), it can be claimed that the cohesiveness of the model for the GFI index was perfect, and acceptable for the AGFI value.

When the index value received after the CFA was analyzed, the result showed that the 17-itemscale was cohesive and usable.

Item Analysis and Findings Related to Reliability

Cra reliability belonging to the whole scale was found to be .83, Cra related to the first sub-factor was .76, Cra related to the second sub-factor was .81, and Cra related to the third sub-factor was .75. It is considered sufficient for the reliability ratio to be .70 or higher (Nunnally, 1978).

When the item-total test correlations were analyzed, they were found to be above 0.30 for each item. The fact that item-total correlations were .30 or higher is proof of the scale items' validity (Nunnally & Bernstein, 1994). This also indicates that the scale items measure the features that they are required to measure.

The t-values of the bottom and top 27% groups of the scale related to differences between item numbers range from 4.98 and 10.97, and all of them are significant ($p<.01$). Based on this finding, all items of the scale can be used to distinguish differences between individuals.

Discussion and Implications

In this study, a new scale was developed to determine the extent of social presence in e-learning environments by considering social presence indicators prepared by Hughes et al. (2007). The

scale consists of 3 sub-dimensions: interaction, ownership, and affective statements.

All the words used to define social presence such as connection, commitment, sincerity, and openness were related to the features of affective interaction. Humor, facial expressions, and expressing oneself are of great importance in personal or affective communication (Rourke et al., 1999). Some sub-dimensions were considered in line with the indicators: expressing individuals' feelings in e-learning environments (Bussman, 1998; Poole, 2000; Rourke et al., 1999), interacting with other people closely and openly (Eggs & Slade, 1997; Poole, 2000), and sharing information about oneself (Cutler, 1995; Poole, 2000; Rourke et al., 1999). As this side of the scale developed in the study offers a new dimension not present in other scales found in the literature, this scale is of great importance.

Another sub-dimension of social presence is interaction. Mutual interaction helps shape individuals' learning activities as well as the developing and maintaining of relations (Garrison, Anderson, & Archer, 2000). Explaining individuals' ideas to each other (Poole, 2000; Rourke et al., 1999), asking and answering questions, and citing each other's messages are considered signs of interaction.

Feeling that they belong to a group helps individuals explain themselves better and think critically (Swan, Garrison, & Richardson, 2009). According to the literature, indicators that individuals feel they are group members include greeting each other when they are in an environment or leaving an environment (Poole, 2000; Rourke et al., 1999), addressing each other by name (Christenson & Menzel, 1998; Gorham, 1988), and using expressions such as 'we' while talking about group members (Rourke et al., 1999). In this study, items written under the "greeting" title are categorized under "interaction."

At the end of this study, the psychometric features of the scale indicated that the scale is reliable and valid. In studies which aim to determine variables that affect social presence levels in e-learning environments, individuals' social presence levels in e-learning environments can be measured using this scale.

References/Kaynakça

- Annand, D. (2011). Social presence within the community of inquiry framework. *The International Review of Research in Open and Distance Learning*, 12(5), 40-56.
- Aragon, S. (2003). Creating social presence in online environments. *New Directions for Adult and Continuing Education*, 100, 57-68. doi: 10.1002/ace.119
- Biocca, F., Harms, C., & Burgoon, J. (2003). Toward a more robust theory and measure of social presence: Review and suggested criteria. *Presence: Teleoperators and Virtual Environments*, 12(5), 456-480.
- Brown, T. A. (2006). *Confirmatory factor analysis for applied research*. New York: Guilford.
- Bussmann, H. (1998). *Phatic communion*. In G. Trauth, K. Kazzazi, & K. Kazzazi (Eds.), *Routledge dictionary of language and linguistics* (p. 358). London: Routledge.
- Byrne, B. M. (1994). *Structural equation modeling with EQS and EQS/Windows: Basic concepts, applications, and programming*. Thousand Oaks, CA: Sage.
- Christenson, L., & Menzel, K. (1998). The linear relationship between student reports of teacher immediacy behaviors and perceptions of state motivation, and of cognitive, affective and behavioral learning. *Communication Education*, 47, 82-90.
- Cui, G., Lockee, B., & Meng, C. (2012). Building modern online social presence: A review of social presence theory and its instructional design implications for future trends. *Educational and Informational Technologies*, 17(1), 1-25. doi: 10.1007/s10639-012-9192-1
- Cutler, R. (1995). Distributed presence and community in Cyberspace. *Interpersonal Computing and Technology: An electronic Journal for the 21st Century*, 3(2), 12-32.
- DeVellis, R. (2003). *Scale development: theory and applications* (2nd ed.). Thousand Oaks, CA: Sage.
- Eggs, S., & Slade, D. (1997). *Analyzing casual conversation*. Washington, DC: Cassell.
- Field, A. (2005). *Discovering statistics using SPSS* (2nd ed.). London: Sage.
- Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in Higher Education. *Internet and Higher Education*, 11(2), 1-14.
- Gorham, J. (1988). The relationship between verbal teacher immediacy behaviors and student learning. *Communication Education*, 37, 40-53.
- Gunawardena, C. N. (1995). Social presence theory and implications for interaction and collaborative learning in computer conferences. *International Journal of Educational Telecommunications*, 1(2), 147-166.
- Gunawardena, C. N., & Zittle, F. (1997). Social presence as a predictor of satisfaction within a computer-mediated conferencing environment. *American Journal of Distance Education*, 11(3), 8-26. doi: 10.1080/08923649709526970
- Gunawardena, C. N., Carabajal, K., & Lowe, C. A. (2001, April). *Critical analysis of models and methods used to evaluate online learning networks*. Paper presented at the Annual Meeting of the American Educational Research Association, Seattle.
- Hughes, M., Ventura, S., & Dando, M. (2007). Assessing social presence in online discussion groups: A replication study. *Innovations in Education and Teaching International*, 44(1), 17-29. doi: 10.1080/14703290601090366

- Jöreskog, K. G., & Sörbom, D. (1993). *LISREL 8: Structural equation modeling with the SIMPLIS command language*. Chicago: SSI Scientific Software International Inc.
- Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika*, 39, 31-36. doi: 10.1007/BF02291575
- Kang, M., Choi, H., & Park, S. (2007). Construction and validation of a social presence scale for measuring online learners' involvement. In C. Montgomerie & J. Seale (Eds.), *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications* (pp. 1829-1833). Chesapeake, VA: AACE.
- Kass, R. A., & Tinsley, H. E. A. (1979). Factor analysis. *Journal of Leisure Research*, 11, 120-138.
- Kim, J. (2011). Developing an instrument to measure social presence in distance higher education. *British Journal of Educational Technology*, 42(4), 763-777.
- Kim, J., Kwon, Y., & Cho, D. (2011). Investigating factors that influence social presence and learning outcomes in distance higher education. *Computers & Education*, 57(2), 1512-1520.
- Kline, P. (1994). *An easy guide to factor analysis*. New York: Routledge.
- Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd ed.). New York: Guilford Press.
- Kreijns, K. (2004). *Sociable CSCL environments: Social affordances, sociability, and social presence* (Doctoral dissertation). Retrieved from <http://dspace.ou.nl/handle/1820/1030>
- Leh, A. S. (2001). Computer-mediated communication & social presence in a distance learning environment. *International Journal of Educational Telecommunications*, 7(2), 109-128.
- Lomicka, L., & Lord, G. (2007). Social presence in virtual communities of foreign language (FL) teachers. *System*, 35(2), 208-228.
- McLellan, H. (1999). Online education as interactive experience: Some guiding models. *Educational Technology*, 39(5), 36-42.
- Newberry, B. (2001, October). *Raising student social presence in online classes*. Paper presented at the World Conference on the WWW and Internet, Orlando, Florida.
- Nunnally, J. C. (1978). *Psychometric testing*. New York: McGraw-Hill.
- Nunnally, J. C., & Bernstein, I. (1994). *Psychometric theory*. New York: McGraw-Hill.
- O'Neil, H. F. (Ed.). (2008). *What works in distance learning: Sample lessons based on guidelines*. Charlotte, NC: Information Age.
- Olpak, Y. Z. ve Kılıç-Çakmak, E. (2009). E-öğrenme ortamları için sosyal bulunuşluk ölçeğinin uyarlama çalışması. *Yüzüncü Yıl Üniversitesi Eğitim Fakültesi Dergisi*, 4(1), 142-160.
- Pallant, J. (2001). *SPSS survival manual*. Maidenhead: Open University Press.
- Pett, M. A., Lackey, N. R., & Sullivan, J. J. (2003). *Making sense of factor analysis: The use of factor analysis for instrument development in health care research*. CA: Sage.
- Poole, D. M. (2000). Student participation in a discussion-oriented online course: A case study. *Journal of Research on Computing in Education*, 33(2), 162-177.
- Reiser, R. A., & Dempsey, J. V. (2012). *Trends and issues in instructional design and technology* (3rd ed.). Upper Saddle River, NJ: Erlbaum.
- Richardson, J. C., & Swan, K. (2003). Examining social presence in online courses in relation to students' perceived learning and satisfaction. *Journal of Asynchronous Learning Networks*, 7(1), 68-88.
- Rourke, L., Anderson, T., Garrison, D. R., & Archer, W. (1999). Assessing social presence in asynchronous text based computer conferencing. *Journal of Distance Education*, 14(2), 50-71.
- Russo, T., & Benson, S. (2005). Learning with invisible others: Perceptions of online presence and their relationship to cognitive and affective learning. *Educational Technology & Society*, 8(1), 54-62.
- Short, J., Williams, E., & Christie, B. (1976). *The social psychology of telecommunications*. London: John Wiley & Sons.
- So, H. J., & Brush, T. A. (2008). Student perceptions of collaborative learning, social presence and satisfaction in a blended learning environment: Relationships and critical factors. *Computers & Education*, 51(1), 318-336. doi: 10.1016/j.compedu.2007.05.009
- Sümer, N. (2000). Yapısal eşitlik modelleri: Temel kavramlar ve örnek uygulamalar. *Türk Psikoloji Yazıları*, 3(6), 49-74.
- Sung, E., & Mayer, R. E. (2012). Five facets of social presence in online distance education. *Computers in Human Behavior*, 28(5), 1738-1747.
- Swan, K., Garrison, D. R., & Richardson, J. C. (2009). A constructivist approach to online learning: The community of inquiry framework. In C. R. Payne (Ed.), *Information technology and constructivism in higher education: Progressive learning frameworks* (pp. 43-57). Hershey, PA: IGI Global.
- Tavşancıl, E. (2005). *Tutumların ölçülmesi ve SPSS ile veri analizi*. Ankara: Nobel.
- Thompson, B. (2004). *Exploratory and confirmatory factor analysis: Understanding concepts and applications*. Washington, DC: American Psychological Association.
- Tu, C. H. (2000, February). *Strategies to increase interaction in online social learning environments*. Paper presented at the Society for Information Technology & Teacher Education International Conference, San Diego, California
- Tu, C. H. (2002). The measurement of social presence in an online learning environment. *International Journal on E-Learning*, 1(2), 34-45.
- Veneziano, L., & Hooper, J. (1997). A method for quantifying content validity of health-related questionnaires. *American Journal of Health Behavior*, 21(1), 67-70.
- Whiteman, J. A. M. (2002). *Interpersonal communication in computer mediated learning*. Retrieved from <http://eric.ed.gov/PDFS/ED465997.pdf>.
- Zhan, Z., & Mei, H. (2013). Academic self-concept and social presence in face-to-face and online learning: Perceptions and effects on students' learning achievement and satisfaction across environments. *Computers & Education* 69, 131-138.