Social Presence in a Three-Dimensional Virtual World Used for Distance Education

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Abstract

The purpose of this study was to examine differences in social presence among students who had participated in a traditional video conference environment and a 3D virtual world for distance education. Also, characteristics of the 3D environment most affected their social presence, and the users' opinions concerning the 3D environment were revealed. For this purpose, an exploratory, mixed research method was used in this study. Quantitative and qualitative methods were used to collect and analyze the data. The participants included 40 distance education university students, of which 20 in an experimental group (using a 3D virtual world) and 20 in a control group (using traditional methods). The results indicate that students who used the 3D virtual environment reported notably higher social presence. They perceived 3D virtual world as more social than video conference environment. Also, they found the 3D virtual world warm, interesting, and flexible, and that they were active and sociable within such environment. These results showed that 3D virtual worlds can be used effectively in educational environments for distance education students because they provide a rich social presence.

Key words: *distance education and telelearning; interactive learning environments; three-dimensional (3D); virtual reality.*

Introduction

Three-dimensional (3D) virtual worlds are environments that facilitate a high level of interaction (Kalyuga, 2007) and accessibility. They are used in real time (Pence, 2007–2008; Hargis, 2008; Inman, Wright, & Hartman, 2010), provide dynamic feedback, and improve learning performance. 3D learning activities are partly dependent on

the users' prior experience (Thompson, 2007), and 3D virtual worlds are multi-user, online, and interactive environments (Dincer, 2008). The use of these environments has recently become widespread.

Three-dimensional virtual worlds could be defined as a collaboration tool used when there are physical distances between participants who have a sense of being together in a virtual space (Sivunen & Nordbäck, 2014). These worlds allow geographically separated individuals to interact with each other via avatars (Lin & Wang, 2014). Virtual worlds evolved from two-dimensional environments. All 3D environments offer an interface and differ from other environments in their types of user interaction, methods for communication (such as chatting, messaging and avatars' nonverbal communication), greater overall dynamism, and higher levels of user activity (Thomas & Brown, 2009). All these types of interaction and communication are done by using keyboard or mouse.

The characteristics of 3D virtual worlds are believed to be beneficial for education purposes (Richards & Taylor, 2015). Researchers have reported that 3D virtual worlds offer opportunities to enrich educational curricula (Hargis, 2008), and provide methods for more effective communication (Bulu, 2011) and collaboration (Wei, Chen, & Kinshuk, 2012). The distinguishing characteristics of 3D virtual worlds, afforded learning tasks and learning benefits were summarized by Dalgarno and Lee (2010), and their learning model in 3D virtual worlds is presented in Figure 1.
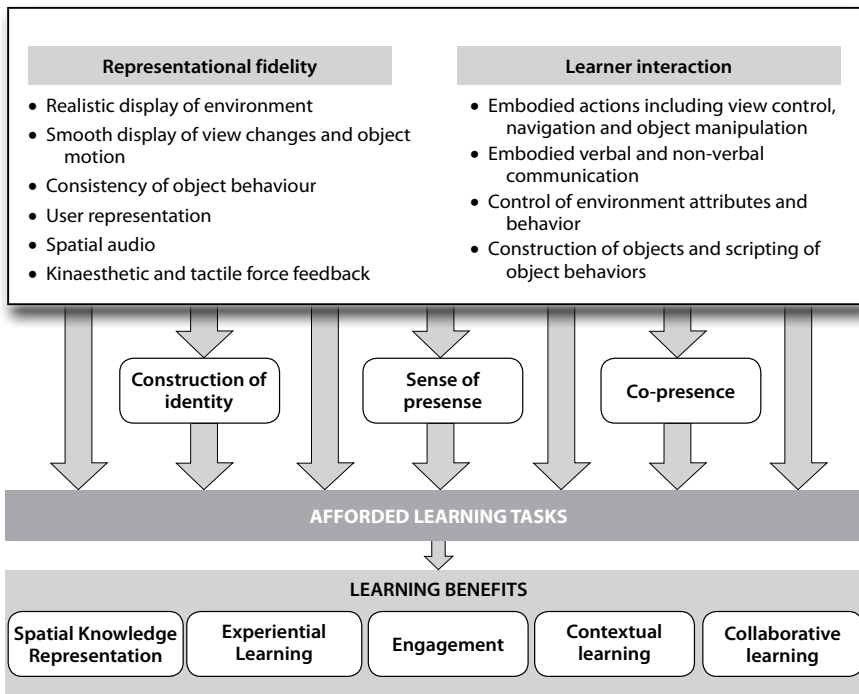

Figure 1. Representation of Dalgarno and Lee's (2010) Learning Model in 3D Virtual Worlds

Because of the distinguishing characteristics of 3D virtual worlds, afforded learning tasks and learning benefits, we can infer that these environments might be useful in particular for distance education. Three-dimensional virtual worlds feature easy access to learning resources, Internet browsing, online study, and user interaction (Dickey, 2003; Ozdinc, 2010). They provide equal opportunities to all students who have access to the required technology (Mcbrien, Jones, & Cheng, 2009), and their structure is interesting and flexible (Hargis, 2008).

The development of 3D virtual worlds is important because they can overcome limitations in traditional distance education, especially regarding communication and interaction (Crellin, Duke-Williams, Chandler, & Collinson, 2009). One of the most important effects is that users have higher social presence, which is described as the degree of awareness of interaction and perception with other people in the environment (Tu, 2002). These virtual worlds also minimize the users' remoteness, which is a negative feature associated with traditional distance education (Gunawardena & Zittle, 1997; Leh, 2001; Dickey, 2005; Traphagan et al., 2010). Social presence in a 3D environment is generated by the users' presence in the virtual environment, and by interactions both with the environment and with other users in the environment (Slater, 1999; Scoresby & Shelton, 2011; Anna et al., 2014).

Social Presence

Short, Williams, and Christie (1976) regarded social presence as a level of interaction with other people (Traphagan et al., 2010). In the literature, other definitions of social presence include "the degree of feeling that one is in the environment socially" (Leh, 2001, p. 110), "the degree of awareness from person to person" (Tu, 2002, p. 294), "the degree of feeling like a real person in the environment" (Gunawardena & Zittle, 1997, p. 9), and "the feeling of being in the environment with others" (Thie & Wijk, 1998, p. 10; Biocca, Harms, & Burgoon, 2003, p. 457). The last is a common definition.

Social presence is the critical factor in a communication medium. It occurs in social context and provides a better understanding of person-to-person telecommunication (Short, Williams, & Christie, 1976). Social presence appears to imply characteristic computer mediated communication (Rice, 1993). It is necessary to enhance effective communication and instruction in an online learning environment (Gunewerdana, 1995; Bentley, Secret, & Cummings, 2015). Social presence for online learning environments is the perception and reaction of being connected in computer-mediated communication (Tu & McIsaac, 2002).

Social presence has three dimensions: interactivity, online communication and social context. These three dimensions are generally used for research of online social presence (Tu & McIsaac, 2002). Interactivity includes feedback and engagement with the interactive learning activities (Walther, 1992). The other dimension of social presence is online communication which is included in communication styles and applications used online (Tu, 2002). Social context is defined as learners' characteristics,

social relations, social processes and their perception about the online learning environment (Williams & Rice, 1983; Steinfield, 1986; Walther, 1992).

Social presence allows students and teachers to be comfortable in both online and face-to-face learning environments (Leh, 2001). Therefore, social presence requires a genuine and approachable learning environment (Rourke, Anderson, Archer, & Garrison, 1999). If users possess a high level of social presence in an environment, they can complete the assigned tasks naturally. If users do not feel that they are part of the environment, then there will be a reduction in the amount of information that they share with other users (Leh, 2001).

The literature includes many studies on how 3D virtual worlds generate social presence in distance education applications. These studies discuss not only the effects of the environment on users' social presence, but also the relationship between social presence and satisfaction. In a study conducted by Hodge, Tabrizi, Farwell, and Wuensch (2007), 3D virtual worlds were found to increase communication, participation, and social presence among the students. Lucia, Francese, Passero, and Tortora (2009) also observed that these environments generate a high level of social presence. According to Bulu (2011), the users' social presence in 3D virtual worlds is one of the main factors that lead to participant satisfaction. Lastly, Ozdinc (2010) emphasized that students participating within 3D virtual worlds have a high social presence; however, Ozdinc (2010) also stated that there is a low relationship between social presence and learning.

Theoretical Framework
Moore's Theory of Transactional Distance

Activities in distance education are based on the reciprocal interaction between teachers and learners who participate from different environments (Moore & Kearsley, 1996). The distance that is caused by different environments can cause problems with communication between the teacher and the students, and misunderstandings (Saba & Shaerer, 1994). According to Moore's Theory of Transactional Distance (1993), the distance between the teacher and the students is regarded as the pedagogical dimension. Even face-to-face environments can be regarded as distant environments, due to the existence of isolated individuals. Distance is eliminated by the student's engagement in the environment and by interaction with peers and the teacher. Thus, factors, situations, and activities which encourage student interactions and participation are highly important (Moore, 1993). The more a student feels a sense of responsibility for others and for him/herself in the environment, the more he/she will be active in the environment. The student's isolation will also proportionally decrease (Moore, 1993; Beck et al., 1996; Bender, 2003). Thus, the important thing in both face-to-face and distance education environments is to minimize isolation. Three-dimensional virtual worlds decrease participant isolation because their environments

offer life-like experiences and richer interaction opportunities. This study examined students' social presence in a 3D virtual world, to compare that with the typical isolation experienced in other forms of distance education. The study was guided by Moore's Theory of Transactional Distance (1993) and was based upon the hypothesis that a high level of social presence will reduce students' isolation.

The Importance of the Study

The factors that increase students' social presence should be studied, in order to replicate them in future education platform designs (especially, but not exclusively, in 3D virtual platforms). These factors appear to eliminate certain limitations of traditional distance education and may increase the efficiency of education more generally (Thomas & Brown, 2009). Encouraging social presence in distance education environments can help to minimize students' isolation (Dickey, 2005). Social presence in 3D environments should also increase student participation, communication, and interaction (Crellin et al., 2009). In this study, 3D virtual learning environment aimed to minimize student's isolation and increase student participation, communication, and interaction.

Social presence is a concept that is difficult to explain, and, at present, there is a need for experimental studies on social presence in distance education environments (Whitelock & Jelfs, 1999; Ozdinc, 2010). Some researchers have stated that quantitative data alone cannot be used to satisfactorily describe such an abstract concept or to detect its components (Slater, 1999; Scoresby & Shelton, 2011). Therefore, this study used both quantitative and qualitative methods for data collection and analysis. Social presence among participants in the 3D virtual learning environment was identified both through quantitative and qualitative data.

Social presence for online learning environment included factors that improve social relationship, learners' perceptions of online environments, communication styles and computer literacy (Tu & McIsaac, 2002; Zhao, Sullivian, & Mellenius, 2014). Lack of social presence may obstruct the development of these factors and affective learning in online environments (Rifkind, 1992). Therefore, social presence is a critical factor in online learning (Tu, 2002; Sung & Mayer, 2012). The study aimed to find out participants' levels of social presence and opinions towards their use of 3D virtual learning environment, and characteristics of the 3D virtual world most affected the students' social presence.

This study compares traditional distance education environments with a 3D virtual world. The definition of a traditional distance education environment is one that is based on web-pages and a virtual classroom. Students connect to the web-pages online after accessing a system using personal usernames and passwords, look up the course resources, and then participate in lessons (sometimes simultaneously with other students) in the virtual classroom. In 3D virtual environments, students can examine

materials and communicate in a more direct and personal fashion (e.g., using avatars to represent themselves) while, perhaps, watching a simultaneous video-conference. In this study, the intent was to examine differences in social presence among students who had participated in a traditional distance education environment and then participated in a 3D virtual world used for distance education, in order to determine which specific characteristics of the 3D environment most affected the students' social presence, and to determine the users' opinions about the 3D environment. For this purpose, both environments were experimentally compared, and the following research questions were investigated:

1. What are the students' levels of social presence within the 3D virtual world?
2. Is there a difference in social presence between students in traditional distance education environments and those using a 3D virtual world?
3. Is there an actual difference between traditional distance education environment and a 3D virtual world environment in terms of students' social presence?
4. Which characteristics of the 3D virtual world most affect the students' social presence?
5. What are the students' opinions concerning the 3D environment in relation to social presence?

Method
Research Design

An exploratory, mixed research method was used in this study. Quantitative and qualitative methods were used to collect and analyze the data. This approach decreases limitations which result from the use of only one of these research methods, and it produces more comprehensive data and results (McMillan & Schumacher, 2010). In the quantitative part of the study, an experimental method was used to examine the effects of a traditional distance education environment and a 3D virtual world on the students' social presence. Additionally, the descriptive method was used to determine the levels of social presence of those students who used the 3D virtual world. In this phase, the participants were randomly assigned to either an experimental group (using the 3D virtual world) or a control group (using traditional distance education approaches). With the experimental group, real-time lessons were conducted within Second Life, which is a 3D virtual environment. The control group received distance education via a traditional-style video conferencing tool, Adobe Connect. Then, qualitative methods were used to determine which factors affected social presence in the 3D environment. In the qualitative part of the study, a case study was examined to analyze the situation in detail. The case study data was composed of face-to face focus group discussions conducted after the students' final exam. Twelve randomly selected students from the 3D group participated in this part of the study. Both the students' opinions of the 3D environment, and the factors that affected their social presence were examined in detail. The summary of our method is presented in Figure 2.

Quantitative Method

- Experimental and control groups were created.
- The participants were randomly assigned into these groups.
- Real-time lessons were conducted in Second Life platform by a teacher for the experimental group. For the control group, traditional-style video conferencing tool, Adobe Connect was used by the same teacher.
- The effects of a traditional distance education environment and a 3D virtual world on the students' social presence were revealed.
- For the experimental group, the levels of social presence of those students who used the 3D virtual world were determined by a survey.
- Data were analyzed with independent t-test to compare the groups.
- Descriptive methods of analysis were used (graphic, frequency etc.).

Qualitative Method

- Qualitative method was used to determine which factors affected social presence in the 3D environment.
- For this, face-to face focus group discussions with 12 students were conducted after the students' final exam.
- For content analyses, NVIVO program was used. Firstly, 15 codes were determined and then these codes were decreased to nine.
- Additionally, these nine codes were categorized in two sections as "characteristics of the environment" and "individuals' characteristics".

Figure 2. Research design summary

Participants

The participants were all students from one of the major Turkish universities. All were enrolled in the ThB (Bachelor's degree in Theology) program, which is offered by the university's Distance Education Center. All received their lessons in Ottoman Turkish within the ThB program, and had access to computers with appropriate technical specifications. The ThB distance education program has 500 students, and it enables students to obtain a Bachelor's degree in two years. Students are able to access course content via a learning management system (LMS). The courses are conducted through synchronous and asynchronous activities, such as participation in a virtual classroom, forum discussions, online exams, e-learning modules, taking lesson notes, and engaging in video-lessons. Although 500 students follow the ThB distance education program, approximately 90/100 students attend the video conference lessons. Also, high-level computer skills and appropriate computer characteristics are required to run Second Life. Therefore, we sent a survey to students to attend video conference lessons to reveal their skill levels and their computer characteristics. Based on the survey results, we invited them to 3D virtual environment for the course. Students who volunteered, who had high-level computer skills and had appropriate

computer characteristics were selected for the experimental group. The control group was made up of students who attended the video conference lessons. We asked them whether they had followed all of the lessons during our implementation process. According to this, our sample comprised 40 freshman students (20 in the experimental group, and 20 in the traditional-style control group).

The students in the experimental group possessed high-level computer skills, and their computers had appropriate characteristics for using the 3D environment. Prior to the study, the students completed a survey to disclose their skill levels and their computer features. Twenty students were selected for the experimental group and were contacted by the researchers. Instructions were then provided for the experimental group about how to enter the 3D environment, how to use it, and how to connect to it via synchronous communications. These guidelines were sent by e-mail to the experimental group.

Procedure

The research process included preparation, creation of the experimental and control groups, adaptation, a pilot scheme, implementation, and evaluation. The entire process took eight weeks. Details are provided in Table 1, and visual images of the 3D environment are shown in Figure 3.

Figure 3. Screenshots of the 3D virtual environment

Table 1

The study procedure

THE PROCESS	CONDUCTED OPERATIONS
The Preparation Process of the Environment *(Week 1)*	• An environment was purchased from the Second Life online software. • The environment was designed to coincide with the class design, which was divided between the classrooms for the lessons and an environment in which additional materials were presented. For this, a duplex house was selected. The first floor was designed like a classroom including chairs, board and teacher desk. The second floor was designed as a room for presentations, videos and other resources. • Informing/guiding panels were placed in the environment. • To prevent the participants from using the environment prematurely, video and text-based instructions were prepared on how to become affiliated with the Second Life, how to set up the program, how to go to the virtual classroom, and how to use the program.
The Process of Creating the Experimental and Control Groups *(Week 1)*	• An online questionnaire was sent to the sample group to determine whether they had access to computers with high technical specifications which Second Life program can execute and high technical properties of computers are necessary. • Volunteers were selected from this group. • Students with access to suitable computers were randomly appointed to either the experimental or the control group. • An invitation letter and directives were sent to the students in the experimental group, and they were also informed of the plan via telephone and e-mail.
The Adaptation Process *(Week 2)*	• For the adaptation of students, they signed up for our virtual classroom before starting the course. The aim of this adaptation process was to prevent any difficulties during the course. • Students who experienced problems were encouraged via telephone and e-mail, and all of them were enabled to enter the classroom. At certain times, meetings were conducted in the 3D virtual world. Trials were also conducted for activities such as speaking aloud, moving, watching videos, etc.
The Pilot Scheme *(Week 3)*	• A pilot lesson was offered by the branch teacher of the lessons to be presented in the 3D virtual world. • Any problems encountered during the pilot scheme were identified, and solutions were developed. • The students' expectations and opinions were obtained at the end of the lesson.
The Implementation Process *(Weeks 4–7)*	• Implementations were carried out with the experimental group in the 3D virtual world in parallel with the control group. • Each week, the same additional materials were presented to both groups (videos and readings). • In the experimental group, real-time lessons were conducted within the Second Life, which is a 3D virtual environment. The control group received distance education via a traditional-style video conferencing tool, Adobe Connect. • During the first 3 weeks within the 4-7 weeks, the same teacher offered the lessons; during the last week, a different teacher offered the lessons, and different avatars were used to represent each teacher. For this course, two teachers taught the lessons. The first teacher should have conducted the course until the half of semester period. Because the first teachers' lessons were finished in week 6 of our implementation, the second teacher lectured in the last week. The same teachers conducted lessons in both groups.
The Evaluation Process *(Week 8)*	• Online questionnaires were sent out to all of the students at the end of the process. • A face-to-face focus group discussion was conducted with 12 randomly chosen students from the 3D group.

Data Collection Tools

Three different data collection tools were used. In the quantitative part of the study, data for the first and second research questions were collected with the Turkish

adaptation (Bardakci, 2010) of the *Scale of Perceived Sociability of Online Learning Environments* (See Appendix 1), which was originally developed by Kreijns, Kirschner, Jochems, and Van Buuren (2007). The alpha reliability coefficient of the scale was calculated as 0.92. The scale includes a single factor consisting of 10 items and is in the form of a 5-point Likert-type scale.

For the third and fourth research questions, six items that were appropriate for the study were selected from the "Social Presence" scale (Hills, 2005) that was developed by Short, Williams, and Christie (1976). These items were used to describe the environment: "Cold/Warm," "General/Individualistic," "Passive/Active," "Asocial/ Social," "Limited/Flexible," and "Boring/Interesting." Each item was graded according to a 7-point semantic differential scale.

The data collection in the qualitative part of the study was done by means of a semi-structured interview developed by the researchers and examined by two experts. The qualitative interview data were used to support the quantitative data, to provide a more detailed understanding of the reasons for the results, and to determine the users' experiences in the 3D virtual world. We provide some sample questions of the interview form: "What were your experiences in the 3D virtual world?", "How did this environment affect you?", "What were the differences between LMS system and 3D virtual worlds?", "Do you think these 3D virtual environments are appropriate for distance education?", "What do you think of avatars, what was it like?", "When you entered the classroom in the 3D virtual world, could you say it was mine?" etc. Because the interview was semi-structured, other questions were shaped according to the students' answers. All questions were related to the 3D virtual environments and individuals' characteristics.

At the end of the semester, a 40-minute face-to-face focus group discussion was conducted with 12 voluntary students from the experimental group. Other students in the experimental group did not want to participate in the interview. Since we focused on examining their experiences of 3D virtual worlds, we only interviewed students in the experimental group. Also, it was important to examine the experimental group's views because there were significant differences between 3D virtual worlds and video conference. We actually focused on why these differences were revealed in the 3D virtual world.

Data Analysis

Firstly, the data was analyzed with an independent t-test to compare the groups. The negative items included in the scales were reversed, and the data was tested for normality. Field (2009) stated that skewness and kurtosis statistics should range between -2 and +2 for normality. According to this, our data regarding students' social presence (Skewness=-.194, Kurtosis=-.899) and their perceived characteristics of the 3D virtual world in terms of social presence (Skewness=-.430, Kurtosis=-.831) had a normal distribution. All skewness and kurtosis statistics are presented in Table 2 according to the groups. Total scores of students' social presence and environments'

sociability were calculated as means of their items. The scales showed high coefficients (α > 0.80) of internal consistency (Colton & Covert, 2007). Secondly, the qualitative data from the focus group discussion were transcribed and analyzed. For content analyses, NVIVO program was used. At first, 15 codes were determined and then these codes decreased to nine. In addition, these codes were categorized in two sections as "characteristics of the environment" and "individuals' characteristics".

Table 2

Skewness and kurtosis statistics for normality

	Students' social presence		Environments' sociability	
	Skewness	Kurtosis	Skewness	Kurtosis
Experimental Group	-1.737	1.942	-1.862	1.849
Control Group	-.016	-.272	-.198	-.795

Results

The findings are presented in accordance with the order of the research questions. The quantitative data are presented first. These results are then supported by the qualitative data, and finally, all are examined in detail. Tables and figures are used to present the quantitative data. For the qualitative data, a separate code ("S_X") was given to each participant.

Social Presence in the 3D Virtual Learning Environment

Table 3 shows the analysis of social presence among the participants in the 3D virtual learning environment. These participants answered "neutral" to the two items "creating a high-performance environment" and "developing good studying relations with classmates." They answered, "Agree" for all of the other items. The users easily established communication within the environment and did not feel isolated. They also got along with their fellow classmates, and felt both comfortable and had a sense of belonging to the class.

Table 3

The students' perceived levels of social presence in the 3D virtual world

Items	M	SD
Getting along with other classmates	3.85	1.04
Easily establishing communication	3.80	1.20
Conducting routine conversations	3.75	0.97
Not feeling isolated	3.65	1.23
Leaving/making a good impression	3.60	0.99
Feeling like a member of the class	3.60	1.05
Feeling comfortable	3.45	1.15
Creating a high-performance environment	3.30	1.08
Allows for non-task-related conversations	3.25	1.46
Developing good studying relations with classmates	3.20	0.95
Total	3.55	

The Students' Social Presence in the 3D Virtual World Compared with the Traditional Distance Education Environment

In this study, students' social presence in both groups was compared. Both environments were evaluated with the independent t-test. As shown in Table 4, there was a significant difference in social presence between the experimental and the control group ($t = 4.71$, $p < .05$). According to the results, students in the 3D virtual world had a higher level of social presence than the students who attended the video conference. It can be inferred that the 3D virtual worlds may enhance students' social presence.

Table 4

The students' social presence according to the groups

Group	M	S	t	p
Experimental Group	35.45	8.77	4.71	0.00
Control Group	24.60	5.40		

A Comparison of the Two Learning Environments, Relating to Social Presence

In this study, environments of the 3D virtual world and video conference were compared according to students' perceptions of social presence. As shown in Table 5, the two learning environments differed significantly ($t = .49$, $p < .05$) in relation to the users' social presence. According to the results, 3D virtual world environment's characteristics were perceived more social than video conference.

Table 5

The difference between the 3D virtual world and video conference environments in relation to the perceived social presence

Group	M	S	t	p
Experimental Group	30.55	6.65	0.49	0.00
Control Group	17.75	7.18		

Characteristics of the 3D Virtual World Which Are Relevant to Social Presence

When social characteristics of the 3D virtual environment were examined to determine which were most related to social presence, the participants stated that they found the environment warm, interesting, and flexible, and that they were active and

Table 6

Characteristics of the 3D virtual environment

Social Characteristics of 3D Environments	Mean	SD
Cold-Warm	5.30	1.60
General-Individualistic	3.45	1.73
Passive-Active	5.40	1.46
Asocial-Social	5.65	1.63
Limited-Flexible	4.95	1.91
Boring-Interesting	5.80	1.54

sociable within the environment. The users also stated that the environment was not individualistic but appealed to all of the users. Based on the item averages, a preference for the 3D virtual world was emphasized in all of the items except "environment being non-individualistic" (see Table 6).

Students' Opinions about the 3D Environment, Relating to Social Presence

Table 7 shows the themes and codes derived from the responses of the 3D group. The themes are characteristics of the environment and the participants' characteristics.

Table 7

The coded responses of the 3D group

THEMES	CODES	f
Characteristics of the Environment	Interesting	10
	Realistic	8
	Strong communication	7
	Flexible	7
	Warm	5
Individuals' Characteristics	A feeling of presence in the environment	11
	A feeling of belonging in the environment	9
	A feeling of not being isolated in the environment	8
	Being active in the environment	8

An Interesting Environment

The 3D virtual world was regarded as interesting, due to its particular characteristics. One participant stated the following:

The 3D virtual classroom environment interested me a lot, because in the normal live classroom environment, we do not have an opportunity to ask our teacher many questions. Even if we can ask, the answer is not always satisfactory. However, in the 3D virtual classroom, when we ask, "Teacher, may I ask a question?" our teacher quickly deals with us. This makes us feel as though we are in a real classroom. So, there is an opportunity for the teacher to become personally involved. **(S_3)**

A Realistic Environment

Another point emphasized by the participants was that the 3D virtual world provided a realistic environment:

Normally, I do not know the names of my friends because we gather in different environments via the Internet. However, the 3D virtual world gives the impression that we see—albeit with our avatars—our friends near us. **(S_12)**

The 3D virtual world is so real that, when the avatar bends its head in the case of an unusual situation, we tell our friends, "Be orderly my friend!" and we crack a joke. **(S_1)**

The Environment Promotes Communication

Participants in the 3D group emphasized that the environment promoted strong communication:

The 3D virtual world helped me to communicate easily. When we connect from the live class alone, we cannot talk with other participants, know their thoughts, or get information on whether they have completed preliminary preparation. In the 3D virtual world, I can connect with my friends and see them all together. It is very important that we state our feelings out loud. We can discuss some subjects before the lessons, and we can ask each other: "Can you please solve this problem, I couldn't." **(S_4)**

It is very important that we can communicate with many friends at the same time. While chatting by writing, there are some problems, such as: "my writing is deleted," "who wrote what?" So, when the situation is like this, although we have never seen each other before, when we actually see each other, it is as though we have all been together for a long time and like we are one. **(S_8)**

We are meeting new friends in the 3D virtual world. When a new friend comes to the environment, we become curious about him/her, and we communicate with him/her. However, we do not have such opportunities in other live classroom applications. We may not have the opportunity to get to know each other. **(S_2)**

A Flexible Environment

One of the pertinent characteristics of the 3D virtual environment is its flexibility. The participants emphasized that they were able to communicate in the environment at any time:

We are 500 people as the students of ThB; but we have some friends that we know very well, and we see each other. When we want to study together with our friends for our lessons, we know that our university has a 3D virtual world environment. When we agree together outside the lesson and enter the classroom, it means that we act in concert. Using this environment for things other than the lessons is very helpful to me. **(S_7)**

We communicate with our friends, and we can connect to the 3D virtual world on other days when there is no scheduled lesson. Sometimes, I connect to the virtual world only to look for who is online. I have my heart in that environment. Sometimes, I wonder if any of my friends are there. **(S_9)**

A Warm Environment

One of the emphasized characteristics was the warmth of the environment:

The 3D virtual world is a warmer environment than other places where we act in concert. We feel like a part of the environment, and we also feel that we integrate with the classroom. I follow the lessons with these feelings. **(S_7)**

In the 3D virtual world, we sometimes crack jokes with our friends. We can listen to the lessons and enjoy them at the same time. So, this environment is very warm. **(S_10)**

I find the 3D virtual world warm. Sometimes we make jokes among us. For instance, when some of our friends fly, others ask: "Why can't we fly?" and we make jokes, saying: "You have so much sin, you cannot fly." **(S_2)**

Feeling of Presence in the Environment

One pertinent effect of the 3D virtual environment is that it made the participants feel as if they were actually in the environment:

Sometimes, when someone sits on the chair that is in front of us, we cannot see the board. Participants who sit at the back, in particular, have difficulty seeing the board. However, this situation replicates a similar mood, as if we are in the classroom. Sometimes, some friends say: "Keep out of my way." **(S_11)**

In the 3D virtual world, we feel as if we are sitting side by side in the same classroom together and listening to the lesson. For instance, when someone bumps into me, it is realistic. Sometimes we ask: "Why did you bump into me?" **(S_7)**

Feeling of Belonging in the Environment

One of the important characteristics of 3D virtual worlds is that students feel that they belong in the environment, and they perceive themselves to be part of the environment:

I see the 3D virtual world as my own classroom. Sometimes we talk with friends. We say: "let's go into the classroom and sit and talk". We feel as if we are in a real classroom. (S_3)

I can briefly describe this situation: When I connect to the 3D virtual world, my children ask me: "Dad, did you enter your classroom?" My communion with the class is reflected by my children. (S_5)

When my child sees the 3D virtual world, she says, "let's go to my mother's classroom." (S_10)

Being Social

It might be expected that distance learners would feel alone, due to their physical isolation. However, the environment prevents participants from feeling alone and enables them to interact socially. These characteristics were found to be important:

Sometimes we feel alone and distant in the ThB program. Normally, we are alone while listening to the lessons; but, when we connect to the 3D virtual world, we are motivated by seeing that there are many people there. **(S_4)**

I do not feel alone in the 3D virtual world, and I think that this is a good application in terms of a circle of friends. **(S_8)**

Being Active

In addition, the participants also emphasized the importance of being active in the environment:

For instance, I feel sleepy while listening to a lesson after the first 15minutes; but, in the virtual world, I listen until the end of the lesson. Activity and the continuous chat between students, in particular, increase my attention to–and focus on–the lesson. **(S_1)**

Previously, I sometimes missed the class; however, I have not missed this class yet, as I feel more active in the 3D virtual world. **(S_6)**

The Comparison of Traditional Distance Education and the 3D Virtual World

Finally, the following are the participants' opinions, comparing the characteristics of the two environments that they used:

It is a good thing to see the teacher in a live classroom application. However, we see our teacher within a certain framework. Seeing the teacher in the live classroom is an advantage; but it is disadvantageous not to see anything other than the teacher. There is no visual effect in the traditional environment. However, in the 3D virtual world, each individual having an avatar and the environment being visual is a very big advantage for us. **(S_3)**

It is my personal opinion that the 3D virtual world is very different from the live classroom. We have warm contacts in the 3D environment. For example, think about a high-school student. Think about a student who receives education in the same classroom for four years and a student who receives education in different classes with different friends each term. That is the difference… In the 3D virtual world, I feel as if I was in a real classroom. **(S_11)**

Conclusion and Discussion

In this study, a 3D virtual world used for distance education was examined to determine the users' social presence. The 3D environment facilitated communication between the students. Feedback and interaction are among the most important variables in the construction of social presence (Whitelock & Jelfs, 1999; Ozdinc, 2010; Sung & Mayer, 2012). Therefore, it is important to design these environments appropriately to permit students to communicate and interact. The theory of transactional distance states that the factors, situations, and activities which facilitate student participation and interaction should be taken into consideration (Moore, 1993). Environments that are designed appropriately for communication and interaction will therefore be helpful in overcoming the limitations of distance education.

Students did not feel isolated in the 3D virtual environment. The characteristics of the 3D environment increase social presence, thereby overcoming this common shortcoming of distance education (Thomas & Brown, 2009). Moore (1993) stated that this deficiency can be overcome by ensuring that individuals feel that they belong in the environment. In addition, it has also been shown that the presence of other individuals in 3D virtual worlds, who are gathered for the same purpose, positively affects levels of satisfaction (Lucia et al., 2009; Ozdinc, 2010). From this perspective, it is important to provide activities in which the students will not feel isolated (Albuquerque & Velho, 2002).

The 3D virtual world offered an opportunity for students to participate in activities, and also provided a high-performance learning environment. In addition, the students stated that they developed good studying relationships with their friends. The opportunities for communication and social interaction provided by the 3D virtual environment support the formation of beneficial studying relationships (Lucia et al.,

2009; Ozdinc, 2010). The students felt a sense of belonging and felt comfortable in the environment. They reported that their physical representation by avatars provides presence (Crellin et al., 2009; Thomas & Brown, 2009; McCreery, Wallet, & Clark, 2015). Moreover, their comfort within the environment and experiences of realistic situations helped to increase their social presence (McCall, O'Neill, & Caroll, 2004; Ozdinc, 2010). These environments give the impression of being in a real classroom (Puterbaugh, Shannon, & Gorton, 2010), and this situation changes learning from being a concept into an action (Thomas & Brown, 2009).

The students' responses indicated that the 3D virtual environment provided a warm, interesting, and flexible structure. The students perceived these characteristics during their construction of social presence (Crellin et al., 2009). Accordingly, when designing 3D virtual environments, it is important to provide activities that include warm, interesting, and flexible situations. In addition, the students stated that they were active and sociable within the 3D virtual world. These factors are required so that students will feel comfortable and that they belong within the environment (Mantovani & Castelnuovo, 2003; Bulu, 2011). In fact, they stated that 3D virtual worlds are realistic, and that they felt like they were a part of the environment and belonged in the environment. This contributes to students accomplishing their given tasks (Bozkurt, 2011) and therefore generates social presence. Social presence within the 3D virtual world makes the environment seem welcoming (Rourke, Anderson, Archer, & Garrison, 1999) and also enables students to feel comfortable in the environment (Leh, 2001).

Finally, the comparison with traditional distance education indicates that the 3D virtual world generated stronger social presence. Moore (1993) suggested that this strong social presence is due to these environments imparting a greater sense of responsibility to the students. In other words, the more the students are productively interactive with others in the environment, the more reduced their feeling of isolation will be (Moore, 1993; Beck et al., 1996; Bender, 2003). What is more, it was reported that the 3D virtual world had more characteristics that convey presence. The students stated that the 3D virtual world was more realistic (Kayabasi, 2005; Traphagan et al., 2010), better, and warmer than live classrooms in terms of facilitating social relationships (Lombard & Ditton, 1997). This situation can be explained by the students' interaction with objects which affect their social presence (Steuer, 1992). Moreover, realistic environments increase social presence (Ozdinc, 2010). According to these results, the deficiencies in traditional distance education can be resolved through the use of 3D virtual worlds.

The following suggestions are offered, based on our findings:

- Factors that generate social presence in 3D virtual worlds should be examined in a longer-term and larger-scale study.
- A longer-term pilot test should be conducted to observe and resolve shortcomings in this study.

- Distance education lessons can be more effectively conducted using 3D virtual environments rather than by traditional methods (live classroom, student placement, examination, etc.).
- An environment should be constructed in which traditional distance education methods and a 3D virtual world are used together.
- Future researchers working on this topic should plan the study process in more detail because the process of designing a 3D virtual environment is time-consuming.

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Appendix 1.

Items of the Perceived Sociability Scale of Computer-Supported Collaborative Learning (CSCL) Environments

01. This CSCL environment enables me to easily contact my team mates.
02. I do not feel lonely in this CSCL environment.
03. This CSCL environment enables me to get a good impression of my team mates.
04. This CSCL environment allows spontaneous informal conversations.
05. This CSCL environment enables us to develop into a well performing team.
06. This CSCL environment enables me to develop good work relationships with my team mates.
07. This CSCL environment enables me to identify myself with the team.
08. I feel comfortable with this CSCL environment.
09. This CSCL environment allows for non-task-related conversations.
10. This CSCL environment enables me to make close friendships with my team mates.

Društvena prisutnost u trodimenzionalnim virtualnim svjetovima koji se primjenjuju u nastavi na daljinu

Sažetak

Svrha ovog istraživanja bila je istražiti razlike u društvenoj prisutnosti među studentima koji su se, za nastavu na daljinu, koristili tradicionalnom videokonferencijom i 3D virtualnim svijetom. Osim toga, utvrđena su obilježja 3D okruženja koja najviše utječu na društvenu prisutnost i mišljenja korisnika o 3D okruženju. U ovom istraživanju koristile su se različite istraživačke metode. Za prikupljanje i analizu podataka koristile su se kvantitativne i kvalitativne metode. Uzorak ispitanika činilo je 40 studenata koji studiraju na daljinu, od toga je 20 studenata bilo u eksperimentalnoj grupi (koristili su se 3D virtualnim svijetom), a 20 u kontrolnoj grupi (koristili su se tradicionalnim metodama). Rezultati pokazuju da su student koji su se koristili 3D virtualnim okruženjem imali znatno veću društvenu prisutnost. 3D virtualni svijet doživjeli su društvenijim nego videokonferenciju. Uz to su uvidjeli da je 3D virtualni svijet pristupačnije, zanimljivije i fleksibilnije okruženje unutar kojeg su bili aktivni i društveni. Ti rezultati pokazuju da 3D virtualni svjetovi mogu biti učinkovita obrazovna okruženja za studij na daljinu zato što omogućuju veću društvenu prisutnost.

***Ključne riječi:** interaktivna obrazovna okruženja; nastava na daljinu i teleučenje; trodimenzionalno (3D); virtualna stvarnost*

Uvod

Trodimenzionalni (3D) virtualni svjetovi okruženja su koja omogućuju visoku razinu interakcije (Kalyuga, 2007) i dostupnosti. Koriste se u realnom vremenu (Pence, 2007. – 2008.; Hargis, 2008; Inman, Wright, i Hartman, 2010), omogućuju brzu povratnu informaciju te potiču učenje. 3D aktivnosti učenja djelomično ovise o prethodnom iskustvu korisnika (Thompson, 2007). 3D virtualni svjetovi su interaktivna umrežena okruženja s više korisnika (Dincer, 2008). Primjena takvih okruženja u posljednje je vrijeme postala široko rasprostranjena.

3D virtualni svjetovi mogu se definirati kao alat za suradnju kojim se koristimo kad postoji fizička udaljenost među polaznicima koji imaju osjećaj pripadnosti nekoj

grupi u virtualnom prostoru (Sivunen i Nordbäck, 2014). Ti svjetovi omogućuju pojedincima koji su geografski udaljeni da međusobno komuniciraju uz pomoć avatara (Lin i Wang, 2014). Virtualni svjetovi razvili su se iz dvodimenzionalnih okruženja. Sva 3D okruženja imaju sučelje i razlikuju se od drugih okruženja po vrsti interakcije među korisnicima, komunikacijskim metodama (kao što su razgovor, poruke i neverbalna komunikacija među avatarima), većoj cjelokupnoj dinamici i aktivnostima korisnika (Thomas i Brown, 2009). Sve vrste interakcije i komunikacije odvijaju se uz pomoć tipkovnice ili miša.

Obilježja 3D virtualnih svjetova pogodna su za korištenje u obrazovne svrhe (Richards i Taylor, 2015). Istraživanja pokazuju da 3D virtualni svjetovi mogu obogatiti obrazovne kurikule (Hargis, 2008) te poslužiti za učinkovitiju komunikaciju (Bulu, 2011) i suradnju (Wei, Chen, i Kinshuk, 2012). Razlikovna obilježja 3D virtualnih svjetova, zadatke dostupne za učenje i prednosti učenja ukratko su opisali Dalgarno i Lee (2010). Njihov model učenja u 3D virtualnim svjetovima prikazan je na Slici 1.
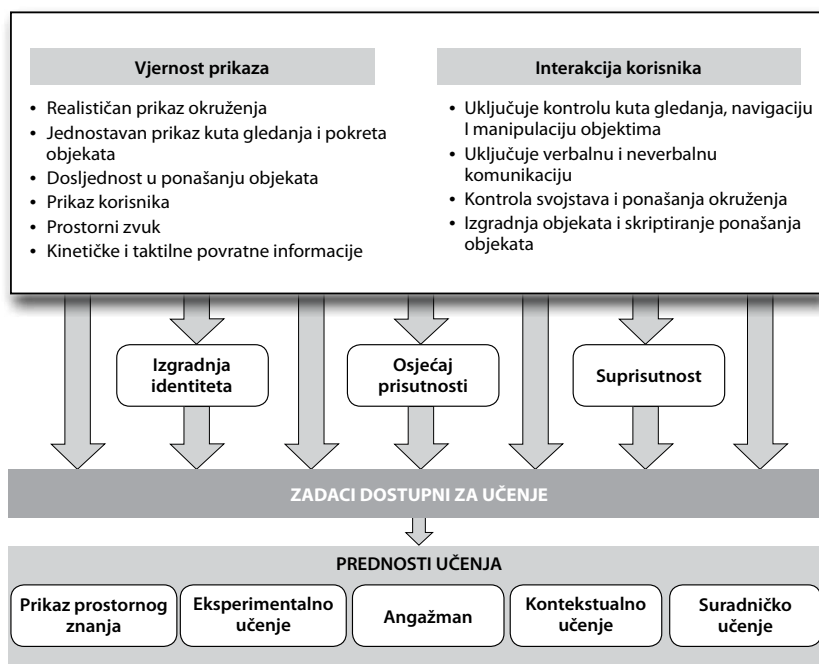
Slika 1. Prikaz modela učenja u 3D virtualnim svjetovima (Dalgarno i Lee, 2010)

Zbog razlikovnih obilježja 3D virtualnih svjetova, zadataka dostupnih za učenje i prednosti učenja možemo zaključiti da ta okruženja mogu biti osobito korisna za nastavu na daljinu. 3D virtualni svjetovi omogućuju jednostavan pristup izvorima znanja, pretraživanje interneta, učenje putem interneta i interakciju korisnika (Dickey, 2003; Ozdinc, 2010). Pružaju jednake mogućnosti za sve studente koji imaju pristup potrebnoj tehnologiji (Mcbrien, Jones, i Cheng, 2009). Njihova struktura zanimljiva je i fleksibilna (Hargis, 2008).

Razvoj 3D virtualnih svjetova važan je zato što nam oni omogućuju da otklonimo ograničenja koja postoje u tradicionalnim načinima obrazovanja na daljinu, osobito u području komunikacije i interakcije (Crellin, Duke-Williams, Chandler, i Collinson, 2009). Jedan od najvažnijih učinaka veća je društvena prisutnost korisnika koja se opisuje kao razina svjesnosti o interakciji i percepciji drugih ljudi u okruženju (Tu, 2002). Virtualni svjetovi također umanjuju osjećaj udaljenosti korisnika koji je negativno obilježje povezano s tradicionalnim obrazovanjem na daljinu (Gunawardena i Zittle, 1997; Leh, 2001; Dickey, 2005; Traphagan i sur., 2010). Društvenu prisutnost u 3D okruženju stvara korisnikova prisutnost u virtualnom okruženju, zatim interakcija s okruženjem i drugim korisnicima u okruženju (Slater, 1999; Scoresby i Shelton, 2011; Anna i sur., 2014).

Društvena prisutnost

Short, Williams i Christie (1976) smatrali su da je društvena prisutnost razina interakcije s drugim ljudima (Traphagan i sur., 2010). Druge definicije društvene prisutnosti navedene u literaturi opisuju je kao"mjeru do koje pojedinac ima osjećaj da je dio društvenog okruženja" (Leh, 2001, str. 110), "stupanj svijesti o pojedincima oko nas" (Tu, 2002, str. 294), "osjećaj da smo stvarna osoba u našem okruženju" (Gunawardena i Zittle, 1997, str. 9) i "osjećaj da smo u okruženju zajedno s drugima" (Thie i Wijk, 1998, str. 10; Biocca, Harms, i Burgoon, 2003, str. 457). Uobičajena je posljednja navedena definicija.

Društvena prisutnost važan je čimbenik u komunikaciji. Pojavljuje se u društvenom kontekstu i omogućuje bolje razumijevanje telekomunikacije među pojedincima (Short, Williams, i Christie, 1976). Čini se da komunikacija putem računala podrazumijeva visoku razinu društvene prisutnosti (Rice, 1993). Potrebno je unaprijediti učinkovitost komunikacije i poduke u umreženom obrazovnom okruženju (Gunewerdana, 1995; Bentley, Secret, i Cummings, 2015). Društvena prisutnost u umreženom obrazovnom okruženju predodžba je i reakcija na povezanost u komunikaciji putem računala (Tu i McIsaac, 2002).

Društvena prisutnost ima tri dimenzije, a to su interaktivnost, komunikacija putem interneta i društveni kontekst. Te tri dimenzije uglavnom se spominju u istraživanjima društvene prisutnosti na internetu (Tu i McIsaac, 2002). Interaktivnost se odnosi na povratnu informaciju i angažman u interaktivnim aktivnostima učenja (Walther, 1992). Druga dimenzija društvene prisutnosti, komunikacija putem interneta, odnosi se na komunikacijske stilove i njihovu primjenu na internetu (Tu, 2002). Društveni kontekst čine osobine učenika, njihova predodžba o umreženom obrazovnom okruženju, društveni odnosi i društveni procesi (Williams i Rice, 1983; Steinfield, 1986; Walther, 1992).

Društvena prisutnost omogućuje studentima i nastavnicima da im bude jednako ugodno u umreženim obrazovnim okruženjima i izravnom poučavanju (Leh, 2001). S obzirom na to društvena prisutnost podrazumijeva autentično i pristupačno

obrazovno okruženje (Rourke, Anderson, Archer i Garrison, 1999). Ako korisnici imaju visoku razinu društvene prisutnosti u okruženju, mogu bez problema izvršiti zadane zadatke. Ako korisnici imaju osjećaj da ne pripadaju okruženju, tada će dijeliti manje informacija s drugim korisnicima (Leh, 2001).

U literaturi se navode mnoga istraživanja o tome kako 3D virtualni svjetovi stvaraju društvenu prisutnost u aplikacijama za nastavu na daljinu. Ta istraživanja ne propituju samo učinak okruženja na društvenu prisutnost korisnika već i odnos između društvene prisutnosti i zadovoljstva. U istraživanju koje su proveli Hodge, Tabrizi, Farwell, i Wuensch (2007) dokazano je da je komunikacija, uključenost i društvena prisutnost veća među studentima u 3D virtualnim svjetovima. Lucia, Francese, Passero, i Tortora (2009) također su primijetili da ta okruženja stvaraju veću razinu društvene prisutnosti. Bulu (2011) ističe da je društvena prisutnost korisnika u 3D virtualnim svjetovima jedan od čimbenika ključnih za njihovo zadovoljstvo. Na kraju, Ozdinc (2010) naglašava da studenti korisnici 3D virtualnih svjetova imaju visoku razinu društvene prisutnosti. Međutim, Ozdinc (2010) također navodi da postoji neznatna povezanost između društvene prisutnosti i učenja.

Teorijski okvir
Teorija transakcijske udaljenosti (Moore's Theory of Transactional Distance)

Aktivnosti u nastavi na daljinu temelje se na recipročnoj interakciji između nastavnika i studenata koji se uključuju iz različitih okruženja (Moore i Kearsley, 1996). Udaljenost koja je rezultat različitih okruženja može uzrokovati probleme i nesporazume u komunikaciji između nastavnika i studenata (Saba i Shaerer, 1994). Prema Mooreovoj *Teoriji transakcijske udaljenosti* (1993) udaljenost između nastavnika i studenta smatra se pedagoškom dimenzijom. Čak se i okruženje u kojem postoji izravna komunikacija može smatrati udaljenim zbog postojanja otuđenih pojedinaca. Udaljenost nestaje kad se student angažira u okruženju i kad je u interakciji s ostalim studentima i nastavnicima. Iz toga proizlazi da su čimbenici, situacije i aktivnosti koji potiču interakciju i sudjelovanje studenata iznimno važni (Moore, 1993). Što student više osjeća odgovornost za sebe i za druge u okruženju, to će biti aktivniji u okruženju. Otuđenost studenta će se također proporcionalno smanjiti (Moore, 1993; Beck i sur., 1996; Bender, 2003). Stoga je najvažnije umanjiti osjećaj otuđenosti kako u okruženjima u kojima se nastava odvija izravno tako i u obrazovnim okruženjima na daljinu. Trodimenzionalni virtualni svjetovi umanjuju osjećaj otuđenosti polaznika zato što ta okruženja nude stvarna životna iskustva i više mogućnosti interakcije. Ovim istraživanjem istražili smo društvenu prisutnost studenata u 3D virtualnom svijetu i usporedili otuđenost koja se uobičajeno pojavljuje u drugim oblicima nastave na daljinu. Istraživanje se temeljilo na Mooreovoj *Teoriji transakcijske udaljenosti* (1993) i pretpostavci da visoka razina društvene prisutnost umanjuje osjećaj otuđenosti studenata.

Važnost istraživanja

Potrebno je istraživati čimbenike koji povećavaju društvenu prisutnost studenata kako bi ih se preslikalo u oblikovanju budućih obrazovnih platformi (osobito, ali ne isključivo, 3D virtualnih platformi). Čini se da ti čimbenici eliminiraju određena ograničenja tradicionalnog obrazovanja na daljinu i općenito mogu povećati učinkovitost obrazovanja (Thomas i Brown, 2009). Poticanje društvene prisutnosti u obrazovnim okruženjima na daljinu može pomoći u smanjenju osjećaja otuđenosti studenata (Dickey, 2005). Društvena prisutnost u 3D okruženjima također bi trebala potaknuti uključenost studenata, komunikaciju i interakciju (Crellin i sur., 2009). Cilj ovog istraživanja bio je umanjiti osjećaj otuđenosti studenata i potaknuti njihovu uključenost, komunikaciju i interakciju uz pomoć 3D virtualnog obrazovnog okruženja.

Društvena prisutnost koncept je koji nije jednostavno objasniti pa trenutno postoji potreba za eksperimentalnim istraživanjima društvene prisutnosti u obrazovnim okruženjima na daljinu (Whitelock i Jelfs, 1999; Ozdinc, 2010). Neki istraživači navode da se pri opisivanju takvog apstraktnog koncepta ili otkrivanju njegovih sastavnih dijelova ne mogu na zadovoljavajući način upotrijebiti isključivo kvantitativni podaci (Slater, 1999; Scoresby i Shelton, 2011). Stoga je u ovom istraživanju provedeno kvantitativno i kvalitativno prikupljanje podataka, a zatim analiza tih metoda. Društvena prisutnost sudionika 3D virtualnog obrazovnog okruženja uočena je kako pri prikupljanju podataka na kvantitativan način tako i na kvalitativan način.

Društvena prisutnost u umreženom obrazovnom okruženju uključivala je čimbenike koji potiču društvene odnose, percepciju studenata o umreženim okruženjima, komunikacijske stilove i informacijsku pismenost (Tu i McIsaac, 2002; Zhao, Sullivian i Mellenius, 2014). Pomanjkanje društvene prisutnost može ometati razvoj tih čimbenika i afektivno učenje u umreženim okružjima (Rifkind, 1992). Društvena prisutnost stoga je ključni čimbenik učenja putem interneta (Tu, 2002; Sung i Mayer, 2012). Istraživanje je otkrilo da razina društvene prisutnosti polaznika ovisi o njihovim stavovima o 3D virtualnim obrazovnim okruženjima kao i značajkama 3D virtualnih svjetova.

Ovo istraživanje uspoređuje tradicionalna obrazovna okruženja na daljinu s 3D virtualnim svijetom. Definicija tradicionalnog obrazovnog okruženja na daljinu temelji se na mrežnim stranicama i virtualnoj učionici. Studenti se povežu na mrežne stranice na internetu nakon što pristupe sustavu koristeći se osobnim korisničkim imenom i lozinkom, pretražuju materijale za učenje i nakon toga sudjeluju u nastavi (ponekad istodobno s ostalim studentima) u virtualnoj učionici. U 3D virtualnim okruženjima studenti mogu pretraživati materijale za učenje i komunicirati na izravniji i osobniji način (npr. koristeći se avatarima koji ih predstavljaju), kao i istodobno gledati videokonferenciju. Svrha ovog istraživanja bila je istražiti razlike u društvenoj prisutnost među studentima koji su najprije sudjelovali u tradicionalnom obrazovnom okruženju na daljinu, a nakon toga u 3D virtualnom svijetu koji se

primjenjuje za nastavu na daljinu. Cilj nam je bio utvrditi specifične značajke 3D okruženja koje najviše utječu na društvenu prisutnost studenata i mišljenja korisnika o 3D okruženjima. U tu svrhu oba su okruženja eksperimentalno uspoređivana te se propitivalo sljedeće:

1. Kakva je razina društvene prisutnosti studenata u 3D virtualnom svijetu?
2. Postoji li razlika u društvenoj prisutnosti među studentima u tradicionalnom obrazovnom okruženju na daljinu i onima koji se koriste 3D virtualnim svijetom?
3. Postoji li stvarna razlika između tradicionalnog obrazovnog okruženja na daljinu i 3D virtualnog okruženja u kontekstu društvene prisutnosti studenata?
4. Koje značajke 3D virtualnog svijeta najviše utječu na društvenu prisutnost studenata?
5. Kakva su mišljenja studenata o 3D okruženju u kontekstu društvene prisutnosti?

Metoda
Nacrt istraživanja

U ovom istraživanju koristile su se različite istraživačke metode. Za prikupljanje i analizu podataka koristile su se kvantitativne i kvalitativne metode. Takav pristup otklanja ograničenja koja se javljaju kad se koristi samo jedna metoda istraživanja

Kvantitativna metoda

- Experimental and control group was created.
- The participants were randomly assigned into these groups.
- Real-time lessons were conducted in Second Life platform by a teacher for the experimental group. For the control group, traditional-style video conferencing tool, Adobe Connect was used by the same teacher.
- The effects of a traditional distance education environment and a 3D virtual world on the students' social presence were revealed.
- For the experimental group, the levels of social presence of those students who used the 3D virtual world were determined by a survey.
- Data were analyzed with independent t-test to compare the groups.
- Descriptive methods of analysis were used (graphic, frequency etc.).

Kvalitativna metoda

- Qualitative method was used to determine which factors affected social presence in the 3D environment.
- For this, face-to face focus group discussions with 12 students were conducted after the students' final exam.
- For content analyses, NVIVO program was used. Firstly, 15 codes were determined and then these codes were decreased to nine.
- Additionally, these nine codes were categorized in two sections as "characteristics of the environment" and "individuals' characteristics".

Slika 2. Sažetak nacrta istraživanja

te daje sveobuhvatnije podatke i rezultate (McMillan i Schumacher, 2010). U kvantitativnom dijelu istraživanja koristila se eksperimentalna metoda kako bi se utvrdio utjecaj tradicionalnog obrazovnog okruženja na daljinu i 3D virtualnog svijeta na društvenu prisutnost studenata. Uz to, primijenjena je deskriptivna metoda kako bi se utvrdila razina društvene prisutnosti onih studenata koji su se koristili 3D virtualnim svijetom. U ovoj fazi ispitanici su bili nasumce podijeljeni ili u eksperimentalnu grupu (koja se koristila 3D virtualnim svijetom) ili u kontrolnu grupu (koja se koristila tradicionalnim pristupom nastavi na daljinu). U eksperimentalnoj grupi nastava se odvijala u realnom vremenu unutar 3D virtualnog okruženja Second Life. Kontrolna grupa imala je nastavu na daljinu uz pomoć tradicionalnog alata za videokonferencije Adobe Connect. Nakon toga koristili smo se kvalitativnim metodama kojima smo željeli utvrditi koji su čimbenici utjecali na društvenu prisutnost u 3D okruženju. U kvalitativnom dijelu istraživanja proveli smo analizu slučaja kako bismo detaljnije istražili situaciju. Analiza slučaja sastojala se od izravne rasprave fokus grupe nakon završnih ispita studenata. Dvanaestero nasumce odabranih studenata iz 3D grupe sudjelovalo je u tom dijelu istraživanja. Detaljno smo istražili mišljenja studenata o 3D okruženju i čimbenicima koji su utjecali na njihovu društvenu prisutnost. Sažetak naših metoda prikazan je na Slici 2.

Ispitanici

Svi ispitanici bili su studenti jednog od vodećih turskih sveučilišta. Svi su pohađali ThB program (prvostupnik teologije) koji je u ponudi Sveučilišnog centra za obrazovanje na daljinu. Svi su nastavu pratili na osmanskom turskom jeziku u sklopu ThB programa te su imali pristup računalima odgovarajućih tehničkih svojstava. ThB program obrazovanja na daljinu ima 500 studenata kojima omogućuje stjecanje titule prvostupnika za dvije godine. Studenti imaju pristup nastavnim materijalima putem sustava upravljanja učenjem *Learning Management System (LMS)*. Studij se odvija uz pomoć sinkroničnih i asinkroničnih aktivnosti kao što su: sudjelovanje u virtualnoj učionici, rasprave na forumu, ispiti putem interneta, moduli e-učenja, vođenje bilješki i sudjelovanje u videopredavanjima. Iako Thb program obrazovanja na daljinu pohađa 500 studenata, otprilike 90 do 100 studenata prisustvuje svakoj videokonferenciji. Uz to, potrebno je imati napredne vještine rada na računalu i računala sa specifičnim svojstvima da bi se upravljalo društvenom umrežom Second Life. Stoga smo proveli anketu među studentima koji su pratili nastavu putem videokonferencija kako bismo utvrdili njihove vještine rada na računalu i svojstva njihovih računala. Na temelju rezultata ankete pozvali smo studente da prisustvuju nastavi u 3D virtualnom okruženju. U eksperimentalnu grupu izabrani su studenti koji su se sami prijavili te koji su imali napredne vještine rada na računalu i računala odgovarajućih svojstava. U kontrolnu grupu izabrani su studenti koji su prisustvovali nastavi putem video konferencija. Pitali smo ih jesu li ili nisu sudjelovali u svim kolegijima tijekom našeg procesa provedbe. S obzirom na to naš je uzorak činilo 40 studenata prve godine

studija (20 u eksperimentalnoj grupi i 20 u tradicionalnoj kontrolnoj grupi).

Studenti u eksperimentalnoj grupi imali su napredne vještine rada na računalu pa su njihova računala imala odgovarajuća svojstva za 3D okruženje. Prije istraživanja studenti su ispunili anketu kojom su utvrđeni razina njihovih vještina i svojstva njihovih računala. 20 studenata izabrano je za eksperimentalnu grupu. Njih su kontaktirali istraživači koji su provodili istraživanje. Dali su im upute o prijavi u 3D okruženje, upotrebi tog okruženja i mogućnostima povezivanja s okruženjem putem sinkronizirane komunikacije. Upute su studentima eksperimentalne grupe poslane e-poštom.

Faze procesa istraživanja

Faze procesa istraživanja uključivale su pripremu, definiranje eksperimentalne i kontrolne grupe, prilagodbu, pilot program, provedbu i evaluaciju. Cijeli proces trajao je osam tjedana. Detalji se nalaze u Tablici 1, a slike 3D okruženja prikazane su na Slici 3.

Slika 3

Tablica 1
Faze istraživanja

PROCES	IZVRŠENI POSTUPCI
Proces pripreme okruženja (1. tjedan)	• Kupljeno je okruženje od internetskog softvera Second Life. • Okruženje je osmišljeno tako da se podudara s nacrtom razreda koji je podijeljen na učionicu za nastavu i okruženje u kojem se prezentiraju dodatni materijali. Iz tog je razloga odabrana kuća na dva kata. Prvi kat osmišljen je u obliku učionice sa stolicama, pločom i stolom za nastavnika. Drugi kat osmišljen je kao soba za prezentacije, videouratke i druge materijale. • Info ploče postavljene su u okruženje. • Kako bismo spriječili sudionike u preuranjenom korištenju okruženja, pripremili smo video i tekstualne upute o povezivanju s društvenom mrežom Second Life, instalaciji programa, pristupu virtualnoj učionici i korištenju programa.
Proces definiranja eksperimentalne i kontrolne grupe *(1. tjedan)*	• *Online* upitnik poslan je skupini studenata odabranoj slučajnim uzorkom kako bi se utvrdilo imaju li pristup računalima s naprednim tehničkim svojstvima s obzirom na to da Second Life program zahtijeva upotrebu takvih računala. • Iz te grupe odabrani su studenti koji su se dobrovoljno prijavili. • Studenti koji su imali pristup odgovarajućim računalima nasumce su podijeljeni ili u eksperimentalnu ili u kontrolnu grupu. • Poziv i upute poslani su studentima eksperimentalne grupe poštom i također su upoznati s planom telefonski i e-poštom.
Proces prilagodbe *(2. tjedan)*	• Kako bi se studenti prilagodili, omogućen im je pristup našoj virtualnoj učionici prije početka nastave. Cilj procesa prilagodbe bio je izbjeći bilo kakve teškoće tijekom nastave. • Studenti koji su imali teškoće imali su podršku putem telefona ili e-pošte te im je svima omogućen ulaz u učionicu. U određeno vrijeme održavali su se sastanci u 3D virtualnom svijetu. Također su provedene provjere aktivnosti kao što su govor naglas, pokret, gledanje videouradaka itd.

Pilot program *(3. tjedan)*	• Ponuđeno je održavanje probnog sata s nastavnikom odsjeka o nastavnom gradivu koje će se obraditi u 3D virtualnom svijetu. • Utvrđeni su problemi na koje smo naišli tijekom pilot programa te su pronađena rješenja tih problema. • Na kraju sata prikupljena su očekivanja i mišljenja studenata.
Proces provedbe *(4. do 7. tjedan)*	• Provedba je izvršena istodobno s eksperimentalnom grupom u 3D virtualnom svijetu i kontrolnom grupom. • Svaki tjedan isti su dodatni materijali (video i materijali za čitanje) predstavljeni objema grupama. • U eksperimentalnoj grupi nastava se odvijala u realnom vremenu u 3D virtualnom okruženju Second Life. Kontrolna grupa imala je nastavu na daljinu uz pomoć tradicionalnog alata za videokonferencije Adobe Connect. • Tijekom prva tri tjedna i od 4. do 7. tjedna isti je nastavnik predavao; tijekom posljednjeg tjedna predavao je drugi nastavnik i korišteni su drugačiji avatari koji su predstavljali svakog nastavnika. Za potrebe ovog studija predavala su dva nastavnika. Prvi do polovine semestra, a s obzirom na to da je nastava prvog nastavnika završila u 6. tjednu tijekom našeg procesa provedbe, drugi je nastavnik predavao posljednji tjedan. Isti su nastavnici predavali u obje grupe.
Proces evaluacije *(8. tjedan)*	• Mrežni upitnici poslani su svim studentima na kraju procesa. • Održana je izravna rasprava s fokus grupom od 12 nasumce odabranih studenata iz 3D grupe.

Alati za prikupljanje podataka

U istraživanju su se koristila tri različita alata za prikupljanje podataka. U kvantitativnom dijelu istraživanja podaci za prvo i drugo istraživačko pitanje prikupljeni su uz pomoć na turski prilagođene (Bardakci, 2010) Skale percipirane društvenosti umreženih obrazovnih okruženja *(Scale of Perceived Sociability of Online Learning Environments)* (vidi Dodatak 1), koju su prvotno osmislili Kreijns, Kirschner, Jochems, i Van Buuren (2007). Izračunato je da je alfa koeficijent pouzdanosti skale bio 0,92. Skala uključuje jedan faktor koji se sastoji od 10 tvrdnji te ima oblik Likertove skale od 5 stupnjeva.

Za treće i četvrto istraživačko pitanje odabrano je na skali Društvena prisutnost (*Social Presence Scale*) (Hills, 2005) šest tvrdnji koje su bile relevantne za istraživanj. Skalu su osmislili Short, Williams i Christie (1976). Te su tvrdnje poslužile za opis okruženja: „Nepristupačno/Pristupačno,” „Općenito/Individualno,” „Pasivno/Aktivno,” „Asocijalno/Socijalno,” „Ograničeno/Fleksibilno” i „Dosadno/Zanimljivo.” Svaka je tvrdnja stupnjevana prema *semantičkoj diferencijalnoj skali od 7 stupnjeva.*

U kvalitativnom dijelu istraživanja podaci su prikupljeni uz pomoć polustrukturiranog intervjua koji su osmislili istraživači, a provjerila su ga dva stručnjaka. Podaci dobiveni intervjuom u kvalitativnom dijelu istraživanja koristili su se uz kvantitativne podatke kako bi se utvrdilo detaljno razumijevanje rezultata i iskustava korisnika 3D virtualnog svijeta. Neka nasumce odabrana pitanja iz intervjua glase: „Kakvo je bilo vaše iskustvo u 3D virtualnom svijetu?”, „Kako je to okruženje

utjecalo na vas?", „Kakve su razlike između sustava upravljanja učenjem (*LMS*) i 3D virtualnih svjetova?",„Mislite li da su 3D virtualna okruženja primjerena za nastavu na daljinu?",„Što mislite o avatarima? Kakvo je bilo to iskustvo?",„Kad ste ušli u učionicu u 3D virtualnom svijetu, jeste li se osjećali kao da je ona vaša?" itd. S obzirom na to da je intervju bio polustrukturiran, preostala pitanja oblikovana su prema odgovorima studenata. Sva su pitanja bila povezana sa značajkama 3D virtualnih okruženja i osobinama pojedinaca.

Na kraju semestra održana je izravna 40-minutna grupna rasprava s 12 studenata dobrovoljaca iz eksperimentalne grupe. Ostali studenti iz eksperimentalne grupe nisu željeli sudjelovati u intervjuu. S obzirom na to da su u fokusu istraživanja bila iskustva studenata u 3D virtualnom svijetu, intervjuirali smo samo studente iz eksperimentalne grupe. Bilo je također važno utvrditi stajališta eksperimentalne grupe zato što su postojale značajne razlike između 3D virtualnih svjetova i videokonferencije. Zapravo smo se najviše usredotočili na razloge zbog kojih su te razlike otkrivene u 3D virtualnom svijetu.

Analiza podataka

Rezultati su najprije analizirani uz pomoć nezavisnog t-testa za usporedbu dviju grupa. Izokrenuli smo negativne tvrdnje na skali te je izvršen postupak testiranja normalnosti podataka. Field (2009) je ustanovio da koeficijent asimetrije i koeficijent spljoštenosti trebaju biti u rasponu od -2 do +2 kod testiranja normalnosti podataka. S obzirom na navedeno, naši podaci vezani uz društvenu prisutnost studenata (Koeficijent asimetrije=-,194 Koeficijent spljoštenosti=-,899) i njihovu percepciju značajki 3D virtualnog svijeta u odnosu na društvenu prisutnost (Koeficijent asimetrije=-,430 Koeficijent spljoštenosti =-,831) pokazali su normalnu distribuciju. Statistika koeficijenta asimetrije i koeficijenta spljoštenosti za svaku grupu prikazana je u Tablici 2. Ukupan rezultat društvene prisutnosti studenata i društvenosti okruženja izračunat je kao aritmetička sredina svih vrijednosti. Skale su pokazale visoke koeficijente (α> 0,80) unutarnje konzistencije (Colton i Covert, 2007). Nakon toga smo *transkribira*li i analizirali kvalitativne podatke o raspravi fokus grupe. Za analizu sadržaja koristio se je NVIVO program. Na početku je određeno 15 kodova, a nakon toga broj kodova smanjen je na 9. Kodovi su podijeljeni na dva dijela, jedan pod nazivom „značajke okruženja„ a drugi pod nazivom „osobine pojedinaca".

Tablica 2

Rezultati

Rezultati su prikazani prema redoslijedu istraživačkih pitanja. Najprije su prikazani kvantitativni podaci. Njih nakon toga upotpunjuju kvalitativni podaci. Na kraju je sve detaljno razrađeno. Tablice i grafički prikazi koristili su se za prikaz kvantitativnih podataka. Kod kvalitativnih podataka svakom je ispitaniku dodijeljen pojedinačni kod („S_X").

Društvena prisutnost u 3D virtualnom obrazovnom okruženju

Tablica 3 pokazuje analizu društvene prisutnosti među ispitanicima u 3D virtualnom obrazovnom okruženju. Ti su ispitanici mogli dvije tvrdnje, „stvoreno je okruženje visokih performansi" i „razvija se dobra suradnja s kolegama", označiti oznakom „Neutralan". Sve ostale tvrdnje označavali su oznakom „Slažem se". Korisnici su jednostavno uspostavili komunikaciju unutar okruženja i nisu se osjećali otuđeno. Također su se slagali sa svojim kolegama iz studijske grupe pa im je bilo ugodno i imali su osjećaj pripadnosti grupi.

Tablica 3

Društvena prisutnost studenata u 3D virtualnom svijetu u usporedbi s tradicionalnim obrazovnim okruženjem na daljinu

U ovom istraživanju usporedili smo društvenu prisutnost studenata u obje grupe. Oba okruženja ocijenjena su uz pomoć nezavisnog t-testa. Kao što rezultati u Tablici 4 pokazuju, postojala je značajna razlika u društvenoj prisutnosti između eksperimentalne i kontrolne grupe (*t*=4,71, *p*< ,05). Rezultati pokazuju da su studenti u 3D virtualnom svijetu imali veću razinu društvene prisutnosti od studenata koji su prisustvovali videokonferenciji. Može se zaključiti da 3D virtualni svjetovi mogu povećati društvenu prisutnost studenata.

Tablica 4

Usporedba dva obrazovna okruženja u kontekstu društvene prisutnosti

U ovom istraživanju usporedili smo okruženja 3D virtualnog svijeta i videokonferencije u odnosu na percepciju društvene prisutnosti studenata. Kao što je prikazano u Tablici 5, dva su se obrazovna okruženja značajno razlikovala (*t* =,49, *p*<,05) s obzirom na društvenu prisutnost korisnika. Rezultati pokazuju da su značajke okruženja 3D virtualnog svijeta percipirane društvenijima od značajki videokonferencije.

Tablica 5

Obilježja 3D virtualnog svijeta koja su važna za društvenu prisutnost

Kad su ocjenjivane društvene značajke 3D virtualnog okruženja kako bi se utvrdilo koje su od njih najviše povezane s društvenom prisutnošću, ispitanici su izjavili da su okruženje doživjeli pristupačnim, zanimljivim i fleksibilnim te su mogli biti aktivni i društveni unutar okruženja. Korisnici također navode da okruženje nije individualizirano, već je odgovaralo svim korisnicima. Prema prosjeku svih vrijednosti, značajna prednost dana je 3D virtualnom svijetu u svim tvrdnjama osim u jednoj, „okruženje nije individualizirano" (vidi Tablicu 6).

Tablica 6

Mišljenja studenata o 3D okruženju u kontekstu društvene prisutnosti

Tablica 7 pokazuje teme i kodove izvedene iz odgovora 3D grupe. Teme su značajke okruženja i osobine ispitanika.

Tablica 7

Zanimljivo okruženje

Ispitanici su 3D virtualni svijet doživjeli zanimljivim zbog njegovih posebnih značajki. Jedan ispitanik o tome je rekao:

Okruženje 3D virtualne učionice bilo mi je jako zanimljivo zato što u normalnoj internetskoj učionici nemamo priliku pitati našeg nastavnika mnogo pitanja. Čak i kad nam je dopušteno pitati, odgovor nije uvijek zadovoljavajuć. Međutim, kad u 3D virtualnoj učionici pitamo: „Nastavniče, možemo li postaviti pitanje?", naš nastavnik se odmah bavi nama. To nam daje osjećaj da smo u stvarnoj učionici. Dakle, nastavnik se može osobno uključiti. **(S_3)**

Realistično okruženje

Ispitanici su još istaknuli da je 3D virtualni svijet realistično okruženje:

U pravilu ne znam imena svojih kolega zato što se okupljamo u različitim okruženjima na internetu. Međutim, 3D virtualni svijet ostavlja dojam da vidimo — premda uz pomoć naših avatara — naše kolege blizu nas. **(S_12)**

3D virtualni svijet toliko je stvaran da kad avatar pogne glavu u nekoj neobičnoj situaciji, kažemo našim kolegama: „Smiri se, prijatelju!" i zbijamo šale. **(S_1)**

Okruženje potiče komunikaciju

Ispitanici 3D grupe istaknuli su da okruženje potiče intenzivnu komunikaciju:

3D virtualni svijet pomogao mi je da jednostavno komuniciram. Kad se sami uključimo u internetsku učionicu, ne možemo razgovarati s ostalim polaznicima, znati kakva su njihova razmišljanja ili dobiti informacije o tome jesu li oni završili uvodne pripreme. U 3D virtualnom svijetu mogu se povezati sa svojim kolegama i sve ih zajedno vidjeti. Jako je važno da glasno izričemo svoje osjećaje. Možemo razgovarati o nekim temama prije nastave te tražiti jedni druge: „Možeš li, molim te, riješiti ovaj problem jer ja ne mogu." **(S_4)**

Jako je važno da komuniciramo s više kolega istodobno. Dok razgovaramo putem interneta, mogu se pojaviti problemi i nesporazumi poput: „Izbrisalo mi se ono što sam napisao.„, „Tko je što napisao?". Stoga je kad se nađemo u takvoj situaciji, potrebno riješiti te probleme kako bismo imali uspješnu komunikaciju. Virtualni svjetovi pružaju priliku ljudima da se bolje upoznaju. Iako se nikad prije nisu vidjeli, kad se sretnu u stvarnom svijetu imaju osjećaj da su proveli puno vremena zajedno. **(S_8)**

U 3D virtualnom svijetu upoznajemo nove kolege. Kad se novi kolega prijavi u okruženje, postanemo znatiželjni i započinjemo komunikaciju s njim/njom. Međutim, takve mogućnosti ne postoje u drugim aplikacijama za internetske učionice. Nemamo se prilike *upoznati.* **(S_2)**

Fleksibilno okruženje

Fleksibilnost je jedno od obilježja 3D virtualnog okruženja. Ispitanici su istaknuli da su mogli komunicirati unutar okruženja u bilo koje vrijeme:

500 studenata polazi ThB program. Imamo neke kolege koje dobro poznajemo te ih viđamo. Kad želimo učiti zajedno s kolegama, znamo da naš fakultet ima 3D virtualno okruženje. Kad se zajedno dogovorimo izvan nastave i prijavimo u učionicu, to znači da djelujemo složno. Korištenje okruženja za ono što nije vezano uz nastavu jako mi pomaže. **(S_7)**

Komuniciramo s kolegama i prijavljujemo se u 3D virtualni svijet i u dane kad nema planirane nastave. Ponekad se prijavim u virtualni svijet samo da provjerim tko je na internetu. Privržen sam tom okruženju. Ponekad se pitam je li netko od mojih kolega tamo. **(S_9)**

Pristupačno okruženje

Pristupačnost okruženja bila je jedna od istaknutih značajki:

3D virtualni svijet pristupačnije je okruženje od drugih i u njemu djelujemo složno. Osjećamo se dijelom okruženja. Također imamo osjećaj da smo integrirani u razredu. Tako se osjećam kad pratim nastavu. **(S_7)**

U 3D virtualnom svijetu ponekad zbijamo šale s prijateljima. Istodobno pratimo nastavu i uživamo u tome. Zbog toga je to okruženje jako pristupačno. **(S_10)**

3D virtualni svijet doživljavam pristupačnim. Ponekad se međusobno šalimo. Na primjer, kad netko od naših kolega leti, drugi ga pitaju: „Zašto i mi ne možemo letjeti?" te se zezamo govoreći: „Previše si grešan, ne možeš letjeti." **(S_2)**

Osjećaj prisutnosti u okruženju

Jedan od učinaka 3D virtualnog okruženja pružio je ispitanicima osjećaj da su uistinu bili u tom okruženju:

Kad netko sjedne na stolicu ispred nas, ponekad ne vidimo na ploču. To se često događa onima koji sjede straga. U ovom okruženju pojavljuju se slične situacije, kao da smo u stvarnoj učionici. Ponekad možeš čuti kolegu koji ti kaže: „Makni mi se s puta." **(S_11)**

U 3D virtualnom svijetu osjećamo se kao da sjedimo jedan do drugog u istoj učionici i zajedno pratimo nastavu. Na primjer, kad se s nekim sudarite, to djeluje realistično. Ponekad pitamo: „Zašto si se sudario sa mnom?" **(S_7)**

Osjećaj pripadnosti okruženju

Jedna od glavnih značajki 3D virtualnih svjetova osjećaj je studenata da pripadaju okruženju i da se percipiraju kao dio tog okruženja.

3D virtualni svijet doživljavam kao vlastitu učionicu. Ponekad razgovaramo s kolegama. Kažemo: „Idemo u učionicu sjesti i razgovarati." Osjećamo se kao da smo u stvarnoj učionici. (S_3)

Kratko mogu opisati situaciju: Kad se prijavim u 3D virtualni svijet, moja me djeca pitaju: „Tata, jesi li u svojoj učionici?" Pitanje moje djece odraz je mojeg odnosa s razredom. **(S_5)**

Kad moje dijete vidi 3D virtualni svijet, ono kaže: „Idemo u maminu učionicu." (S_10)

Društvenost

Od onih koji se obrazuju na daljinu moglo bi se očekivati da se osjećaju usamljeno zbog fizičke odvojenosti. Međutim, okruženje ne dopušta polaznicima da se osjećaju usamljeno i omogućuje im da se međusobno druže. Ispostavilo se da je ta značajka važna:

Ponekad se osjećamo usamljeno i otuđeno u ThB programu. Kad pratimo nastavu u pravilu smo sami; no, kad se prijavimo u 3D virtualni svijet, motivira nas kad vidimo da tamo ima mnogo ljudi. **(S_4)**

Ne osjećam se usamljeno u 3D virtualnom svijetu i mislim da je to dobra aplikacija s obzirom na krug prijatelja koje steknemo. **(S_8)**

Aktivnost

Uz sve navedeno ispitanici su također istaknuli važnost aktivnosti u okruženju:

Na primjer, dok pratim nastavu, počne mi se spavati nakon prvih 15 minuta; no, u virtualnom svijetu nastavu pratim do kraja. Aktivnost i neprekidan razgovor među studentima posebno poboljšavaju moju pažnju i usredotočenost na nastavu. **(S_1)**

Prije bih ponekad izostao s nastave. Međutim, u 3D virtualnom svijetu nisam još propustio ni jedan sat zato što mogu biti aktivniji. **(S_6)**

Usporedba tradicionalnog obrazovanja na daljinu i 3D virtualnog svijeta

Na kraju slijede mišljenja ispitanika i usporedba značajki dvaju okruženja kojima su se koristili:

Dobro je što u aplikaciji za praćenje nastave putem interneta vidimo nastavnika. Međutim, nastavnika vidimo unutar zadanog okvira. Prednost je vidjeti nastavnika u internetskoj učionici, ali nedostatak je što se ne vidi ništa drugo osim nastavnika. Nema vizualnih efekata u tradicionalnom okruženju. S druge strane, velika je prednost za nas da u 3D virtualnom svijetu svaki pojedinac ima avatara te je okruženje vizualno atraktivno. (S_3)

Osobno mislim da je 3D virtualni svijet dosta različit od internetske učionice. U 3D okruženju ostvarujemo prisnije kontakte. Uzmimo za primjer nekog srednjoškolca ili studenta koji se obrazuje u istoj učionici četiri godine i studenta koji se obrazuje u različitim učionicama s različitim kolegama svaki semestar. Velika je to razlika. U 3D virtualnom svijetu osjećam se kao da sam u stvarnoj učionici. (S_11)

Zaključak i rasprava

U ovom smo istraživanju proučavali 3D virtualni svijet koji se koristi za nastavu na daljinu kako bismo utvrdili društvenu prisutnost korisnika. 3D okruženje olakšalo je komunikaciju među studentima. Povratna informacija i interakcija sastavne su varijable društvene prisutnosti (Whitelock i Jelfs, 1999; Ozdinc, 2010; Sung i Mayer, 2012). Stoga je važno na pravilan način osmisliti ta okruženja kako bi studentima bilo omogućeno da komuniciraju i da se druže. Prema *Teoriji transakcijske udaljenosti* treba uzeti u obzir okolnosti, situacije i aktivnosti koje olakšavaju sudjelovanje i interakciju studenata (Moore, 1993). Okruženja koja su osmišljena tako da pospješuje komunikaciju i interakciju, pomoći će u otklanjanju ograničenja nastave na daljinu.

Studenti se nisu osjećali otuđeno u 3D virtualnom okruženju. Značajke 3D okruženja povećavaju društvenu prisutnost i time prevladavaju taj uobičajeni nedostatak nastave na daljinu (Thomas i Brown, 2009). Moore (1993) navodi da se taj nedostatak može otkloniti kad se pojedincima omogući da osjećaju pripadnost okruženju. Uz to je također utvrđeno da prisustvo drugih pojedinaca u 3D virtualnim svjetovima koji se povezuju zbog istih razloga pozitivno utječe na razinu zadovoljstva (Lucia i sur., 2009; Ozdinc, 2010). S tog je aspekta važno omogućiti aktivnosti u kojima se studenti neće osjećati otuđeno (Albuquerque i Velho, 2002).

3D virtualni svijet omogućio je studentima sudjelovanje u aktivnostima te se također pokazao obrazovnim okruženjem visokih performansi. Uz to studenti su izjavili da su razvili dobru suradnju sa svojim prijateljima. Mogućnosti koje 3D virtualno okruženje pruža za komunikaciju i druženje potiču suradnju (Lucia i sur., 2009; Ozdinc, 2010). Studenti su imali osjećaj pripadnosti i bilo im jevugodno u okruženju. Izjavili su da njihov fizički prikaz u obliku avatara omogućuje prisutnost (Crellin i sur., 2009.; Thomas i Brown, 2009.; McCreery, Wallet i Clark, 2015). Nadalje, njihov osjećaj ugode unutar okruženja i iskustva realističnih situacija pomogli su im kako bi povećali svoju društvenu prisutnost (McCall, O'Neill, i Caroll, 2004; Ozdinc, 2010). Takva okruženja doimaju se kao stvarna učionica (Puterbaugh, Shannon, i Gorton, 2010) u kojoj učenje nije pojam, već djelovanje (Thomas i Brown, 2009).

Studenti su u svojim odgovorima istaknuli da 3D virtualno okruženje ima pristupačnu, zanimljivu i fleksibilnu strukturu. Studenti su te značajke primijetili tijekom nastanka svoje društvene prisutnosti (Crellin i sur., 2009). Stoga je prilikom osmišljavanja 3D virtualnih okruženja važno omogućiti aktivnosti koje uključuju pristupačne, zanimljive i fleksibilne situacije. Osim toga, studenti navode da su bili aktivni i društveni u 3D virtualnom svijetu. Ti su čimbenici uvjet da se studenti osjećaju ugodno i dijelom okruženja (Mantovani i Castelnuovo, 2003; Bulu, 2011). Studenti zapravo navode da su 3D virtualni svjetovi realistični i da su osjećali pripadnost okruženju. To pridonosi izvršavanju studentskih zadataka (Bozkurt, 2011) i kao posljedicu donosi društvenu prisutnost. Društvena prisutnost u 3D virtualnom svijetu čini okruženje pristupačnim (Rourke, Anderson, Archer, i Garrison, 1999) i omogućuje studentima da se u okruženju osjećaju ugodno (Leh, 2001).

Na kraju, usporedba s tradicionalnim obrazovanjem na daljinu pokazuje da je 3D virtualni svijet stvorio veću društvenu prisutnost. Moore (1993) navodi da je veća društvena prisutnost rezultat činjenice da takva okruženja pružaju studentima osjećaj veće odgovornosti. Drugim riječima što je veća produktivnost i interaktivnost studenata s drugima u okruženju, manji je njihov osjećaj otuđenosti (Moore, 1993; Beck i sur., 1996; Bender, 2003). Osim toga navodi se da 3D virtualni svijet ima više obilježja koja podržavaju prisutnost. Studenti su izjavili da je 3D virtualni svijet realističniji (Kayabasi, 2005; Traphagan i sur., 2010), bolji i pristupačniji od internetske učionice s obzirom na to da potiče stvaranje društvenih veza (Lombard i Ditton, 1997). Interakcija studenata s objektima koji utječu na njihovu socijalnu prisutnost objašnjava takvu situaciju (Steuer, 1992). Uz to realistična okruženja povećavaju društvenu prisutnost (Ozdinc, 2010). Prema dobivenim rezultatima nedostaci u tradicionalnom obrazovanju na daljinu mogu se otkloniti primjenom 3D virtualnih svjetova.

S obzirom na naše rezultate predlažemo sljedeće:
- Potrebno je provesti duže i opsežnije istraživanje čimbenika koji stvaraju društvenu prisutnost u 3D virtualnim svjetovima.
- Potrebno je provesti duže pilot testiranje kako bi se otkrili i otklonili nedostaci ovog istraživanja.
- Nastava u sklopu obrazovanja na daljinu može biti učinkovitije izvedena uz pomoć 3D virtualnih okruženja za razliku od tradicionalnih metoda (internetska učionica, studentska praksa, ispitivanje itd.).
- Potrebno je osmisliti okruženje u kojem će se tradicionalne metode obrazovanja na daljinu koristiti zajedno s 3D virtualnim svijetom.
- Istraživači koji će se u budućnosti baviti ovom temom trebali bi detaljnije isplanirati tijek istraživanja zato što je proces oblikovanja 3D virtualnog okruženja dugotrajan.