Student perceptions of collaborative learning, social presence and satisfaction in a blended learning environment: Relationships and critical factors

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Abstract

The purpose of this study was to examine the relationships of the students' perceived levels of collaborative learning, social presence and overall satisfaction in a blended learning environment. This research studied the relationship of these three variables and identified critical factors related to them. The participants were 48 graduate students who took a blended-format course in health education and worked on a collaborative group project related to the development of a comprehensive HIV-AIDS prevention plan. Data was collected from the Student Perception Questionnaire and face-to-face interviews. The analysis of quantitative data indicated that student perceptions of collaborative learning have statistically positive relationships with perceptions of social presence and satisfaction. This means that students who perceived high levels of collaborative learning tended to be more satisfied with their distance course than those who perceived low levels of collaborative learning. Similarly, students with high perceptions of collaborative learning perceived high levels of social presence as well. Surprisingly, the relationship between social presence and overall satisfaction was positive but not statistically significant. Interview data revealed that (a) course structure, (b) emotional support, and (c) communication medium were critical factors associated with student perceptions of collaborative learning, social presence, and satisfaction. Explanations about findings and implications for instructional design are discussed in the conclusion.
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1. Introduction

A learning environment in a typical classroom can be characterized as active interactions between learner and instructor or between learner and other learners. In distance learning environments, opportunities for those interactions are often limited due to physical separations. Advances in modern communication technology have provided us with several tools to minimize problems related to such geographical distances

so that distance learners these days have several means, both synchronous and asynchronous, to interact with their instructors and classmates. In fact, a recent trend in distance education research goes beyond defining the concept of distance as a physical proximity and puts more emphasis on psychological aspects of distance (Garrison, 2000; Gunawardena & McIsaac, 2004). When approaching the concept of distance as a psychological dimension, there are several important questions to examine: how learners perceive psychological distance; what are the factors affecting learners' perceptions of psychological distance; how learners' perceptions of distance affect their learning; what are the effective strategies to minimize psychological distance. The purpose of this research study, therefore, was to investigate these psychological and transactional issues in distance learning environments. Specifically, the present study aimed to achieve this purpose by examining the complex relationships among social presence, collaborative learning, and satisfaction in a blended learning environment.

2. Theoretical background

2.1. Interaction in distance learning

Before discussing issues with psychological distance, it is important to understand the concept and role of interaction in distance learning environments. Generally, interaction can be defined as a reciprocal communication process between human and human or between human and non-human (e.g., human–computer interaction). In the field of distance education, Moore's three types of interaction (Moore, 1989) may be the most frequently used typology. This framework, focusing on learning events, includes three types of interaction: (a) learner–content interaction, (b) learner–instructor interaction, and (c) learner–learner interaction. The interaction between learner and content takes place when learners gain content knowledge through one or more forms of media such as tutorials, CD-ROMs, or web-based courses. The learner–instructor interaction happens when an instructor delivers content knowledge, provides appropriate scaffolding, clarifies misunderstanding, and increases student motivation. Lastly, the learner–learner interaction occurs when learners in different geographical areas interact with each other to achieve a certain goal. While promoting collaboration among learners has been regarded as a challenging instructional strategy, recent advances in computer-supported collaborative learning (CSCL) technologies have made online collaborative learning more effective and ubiquitous (Koschmann, Hall, & Miyake, 2002). In addition to Moore's framework, Hillman, Willis, and Gunawardena (1994) argue that interaction between learner and interface should be considered as a critical component in technology-mediated learning environments. They stress that "the learner must interact with the technological medium to interact with the content, instructor, or other learners" (p. 33), and that a medium can have great negative effects on the forms of interaction particularly when learners are unfamiliar with the communication technologies used to deliver instruction.

The transactional distance theory (Moore, 1991) explains how interaction affects learners' psychological perceptions of distance. This theory proposes that transactional distance, a learner's perception of psychological and communication gaps caused by a physical separation from instructor and other learners, is a continuous and relative construct which is determined by amounts of *dialogue* and *structure*; when there are higher amounts of dialogue and less structure, a distance learner is likely to perceive a smaller degree of transactional distance. This theory was further supported by empirical research by Saba and Shearer (1994), where they tested a system dynamics model consisting of dialogue, structure, learner control, and instructor control. They found that transactional distance generally decreases as dialogue and learner control increase and as teacher control and structure decrease. Vrasidas and McIsaac (1999), however, argued that an increased structure for collaborative tasks led to active dialogue and interaction among learners, and consequently a decrease in transactional distance. When synthesizing findings of these previous studies, it may be inferred that *collaborative learning structures* allowing more control and dialogue among learners could reduce transactional distance.

2.2. Collaborative learning

Collaborative learning is a form of learner and learner interaction. Historically, collaborative learning has been considered as an effective instructional method in both traditional and distance learning settings (Bernard, Rubalcava, & St-Pierre, 2000). In distance education research, there have been increasing interests

toward collaborative learning approaches, and this phenomenon may be explained by two impetuses: computer-mediated communication (CMC) and social constructivism. Regarding the technical dimension of collaborative learning, CMC tools have played an important role in facilitating group learning processes among group members who may live in different geographical areas and have different learning styles. Previous research has suggested that it is important to provide distance learners with multiple channels, both synchronous and asynchronous, in order to accommodate their preferences for different communication styles (Curtis & Lawson, 2001). In particular, the availability of synchronous communication tools appeared to be critical in the process of collaborative learning (Carr-Chellman, Dyer, & Breman, 2000). While the use of CMC tools can bridge the communication gap, it is important to employ pedagogically sound strategies in order to overcome the psychological gap among distance learners working on collaborative tasks. Assigning learners to work on a group project does not necessarily mean that they will work collaboratively. Learners tend to use a task specialization approach where tasks are divided among group members and there are fewer opportunities to develop mutual engagement, knowledge and skill exchange, and interpersonal communication skills (Kitchen & McDougall, 1998).

The second impetus, the social-constructivist view, has influenced the pedagogical dimension of distance learning. Social constructivism is based on the idea that an individual person constructs his or her knowledge through the process of negotiating meanings with others. Specifically, this constructivist view of learning is associated with the notion of the *Zone of Proximal Development* (Vygotsky, 1978), which proposes that a learner's cognitive development is highly dependent on social interaction and collaboration with more capable and knowledgeable others. For the past decade, social constructivism has influenced distance learning pedagogy to shift from transmissive types of learning focusing on the delivery of content knowledge to collaborative types of learning aiming for the acquisition of higher learning skills. When designed and applied appropriately in distance learning environments, collaborative learning strategies can provide learners with several advantages, such as opportunities to experience multiple perspectives of other distance learners from different backgrounds, and to develop critical thinking skills through the process of judging, valuing, supporting, or opposing different viewpoints (Hakkarainen, Lipponen, & Jarvela, 2002; Stacey, 1999).

2.3. Social presence

In online collaborative learning, strategies promoting the feeling of connectedness and belonging have appeared to be critical for learners (Hara, Bonk, & Angeli, 2000; Harasim, 1993; Kitchen & McDougall, 1998; So & Kim, 2005). As a result, social presence has appeared to be a social and communication factor that is particularly critical to distance learners' perception of psychological distance with their instructor and other learners (Gunawardena & McIsaac, 2004). Short, Williams, and Christie (1976) first introduced the concept of social presence in the field of social psychology and communication, and defined the term as the "degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationships" (p. 65). They contended that social presence is a complex construct affected by two important factors: intimacy and immediacy. An important argument in the earlier social presence theory is that different types of communication media have different capabilities to affect an individual person's perception of social presence (Gunawardena & Zittle, 1997). Later research on social presence, however, suggested that it is not clear whether social presence can be determined solely by properties of media (Rafaeli, 1988; Walther, 1992). Likewise, other researchers contended that the degrees of perceived social presence vary greatly from individual to individual and across time even though people use the same communication medium (Johansen, Vallee, & Spangler, 1988; Lombard & Ditton, 1997). The discussion and debate on social presence and communication media during the past three decades clearly points to a shift in focus from comparing media characteristics to describing the dynamics of users' experiences and perceptions (Shin, 2002). In addition, it appears that there is a lack of knowledge regarding the characteristics and effects of social presence related to communication media and users. More research on these areas is needed.

Recognizing potential problems related to the lack of communication cues and immediate responses, researchers in distance education have examined whether social presence is a critical factor affecting distance students' learning (Gunawardena & Zittle, 1997; Richardson & Swan, 2003; Rourke, Anderson, Garrison, & Archer, 1999; Tammelin, 1998; Tu, 2001; Tu & McIsaac, 2002). Indeed, social presence has received increasing

attention in distance education research and has been examined both quantitatively and qualitatively (Guna-wardena & Mclsaac, 2004). To aid quantitative analysis, Tu (2002) developed and validated an instrument, the Social Presence and Privacy Questionnaire (SPPQ), that measures the underlying dimensions of social presence. In this research, three dimensions appeared to be particularly important in measuring social presence: (a) social context, (b) online communication, and (c) interactivity. In the area of qualitative studies, Rourke et al. (1999) examined how social presence can be assessed through the content analysis of computer conferencing transcripts. The researchers developed a coding scheme which classified social presence into three broad categories: (a) interactive, (b) affective, and (c) cohesive responses. Although there is a need for more research to validate the coding categories and indicators, this study provided a useful research tool for qualitative researchers to analyze and assess the level of social presence in distance learning environments.

2.4. Student satisfaction

The degree of student satisfaction with courses has played an important role in evaluating the effectiveness of distance learning. A meta-analysis of 24 articles reporting student satisfaction with distance education indicated that there was no statistically significant difference between distance education and traditional education formats in terms of student satisfaction levels (Allen, Bourhis, Burrell, & Mabry, 2002). This finding may suggest that students perceive distance education to be as satisfactory as other traditional formats of learning. The result of this meta-analysis is promising. However, there is a need to look more closely at whether there are any factors causing distance student dissatisfaction, frustration, or anxiety. For the purpose of this research, previous studies on student satisfaction related to collaborative learning and social presence were reviewed.

Regarding student satisfaction and collaborative learning, Kitchen and McDougall (1998) found that the majority of participants in their study rated their collaborative learning experiences as good or excellent. Similarly, Jung, Choi, Lim, and Leem (2002) reported that students who participated in online collaborative tasks expressed higher levels of satisfaction with their learning process compared to those who engaged in task-oriented interaction with their instructor. In addition to the level of satisfaction, researchers have investigated important factors affecting the perceptions of student satisfaction with collaborative learning. No significant correlations were found between students' satisfaction and their background characteristics such as age, gender, grade level, and computer literacy (Kitchen & McDougall, 1998; Yaverbaum & Ocker, 1998). Overall, it appeared that students in distance courses are likely to be dissatisfied and frustrated with the following factors: (a) unclear expectations from instructors, (b) tight timeline, (c) workload, (d) poor software interface, (e) slow access, and (f) no synchronous communication (Gaddis, Napierkowsk, Guzman, & Muth, 2000; Kitchen & McDougall, 1998). A relatively small number of studies examined the relationship between social presence and satisfaction. In general, previous research indicates that student perceptions of social presence and satisfaction are likely to be related. Gunawardena and Zittle (1997) found that social presence was a strong predictor of student satisfaction, explaining about 60% of the variance. Likewise, Richardson and Swan (2003) found that students with high perceptions of social presence had high perceptions of learning and high satisfaction with their instructor.

2.5. Blended learning

Blended learning has been referred to as the "third generation" (Phipps & Merisotis, 1999, p. 26) of distance education systems. The first generation was correspondence education which utilized a one-way instructional delivery method, including mail, radio, and television. The second generation was distance education with single technology, such as computer-based or web-based learning. The third generation is blended learning, characterized as maximizing the best advantages of face-to-face learning and multiple technologies to deliver learning. Generally, blended learning means any combination of learning delivery methods, including most often face-to-face instruction with asynchronous and/or synchronous computer technologies. Hybrid learning is another term which has been used synonymously with blended learning.

Online learning environments have been criticized for its lack of human interaction and, for this reason, there has been an increasing movement toward blended learning approaches where students can have

opportunities for both online and offline interaction with their instructors and classmates (Allen & Seaman, 2003). Successful cases in blended learning have shown the importance of creative and systemic thinking to overcome the limitations of face-to-face and online education. The framework suggested by Osguthorpe and Graham (2003) is a particularly useful example in demonstrating the application of a systemic approach in deciding what is blended learning and what are the goals of blending. Beyond the simple combination of face-to-face and online instruction, they identified the three types of mixing in a blended course: (a) learning activities, (b) students, and (c) instructors. They further suggested that blended learning environments vary widely according to the following goals: pedagogical richness, access to knowledge, social interaction, personal agency, cost effectiveness, and ease of revision.

It appears that blended learning methods are effective in facilitating the process of online collaborative learning (Carr-Chellman et al., 2000; Gabriel, 2004; Graham, Scarborough, & Goodwin, 1999). Introductory face-to-face meetings are often used to provide students with opportunities to know other members and to build group cohesiveness for subsequent collaborative work. When it is not feasible or efficient to have face-to-face meetings, instructors can design online 'get to know you' activities where students post their brief introductions and also respond to others (Curtis & Lawson, 2001). Providing one or two early synchronous CMC sessions may be useful for students to have opportunities to introduce themselves and receive immediate feedback. In addition, ice-breakers and collaborative-game type activities can be posted online to help students gain an initial experience with the process of group collaboration.

In blended learning environments, the importance of students' self-motivation and self-management increases because there is less in-class time and more emphasis on self-regulated learning. However, several researchers found that students had difficulty adjusting to blended learning (Aycock, Garnham, & Kaleta, 2002; Bonk, Olson, Wisher, & Orvis, 2002). Aycock et al. (2002), from the experiences of designing and teaching hybrid courses, suggested that students' poor time management skills rather than technologies was a significant obstacle. Another problem in blended learning is that when several components in a learning environment are not well integrated, this can increase the extraneous or ineffective cognitive load in learning processes. These findings imply that simply turning classroom courses into blended formats do not necessarily provide students with more interactive and flexible learning experiences. More careful analysis of learners, contexts, and technologies are needed.

3. Research questions and definition of terms

The review of previous research in distance education shows that there is a lack of research studies that have specifically examined constructs related to psychological distance, such as interaction, collaborative learning and social presence, and that researchers have approached interaction, collaboration and social presence as broad constructs. There is a need for more in-depth research studies investigating the complex issues of psychological distance and its effects on student perceptions in distance learning contexts. This study, therefore, has the aim of examining how student perceptions of collaborative learning, social presence, and overall satisfaction are related, as well as identifying critical factors affecting the different levels of students' perceptions with those variables, as stated in the following research questions:

1. What are the relationships among students' perceived levels of collaborative learning, social presence, and satisfaction?
2. What are the important factors related to students' perceived levels of collaborative learning, social presence, and satisfaction?

Given that terms used in the context of distance education research are often ill-defined due to the abstract nature of constructs, the three variables in the present study were operationally defined for clear understanding and accurate measurement, as follows:

- *Collaborative learning*: An instructional approach in which a small number of learners interact together and share their knowledge and skills in order to reach a specific learning goal.

- *Social presence*: A psychological degree to which a learner perceives the presence of and connectedness with other learners.
- *Satisfaction*: An affective learning outcome indicating the degree of: (a) learner reaction to values and quality of learning, and (b) motivation for learning.

4. Method

This research is a case study using a mixed methodology approach. This method allows researchers to capture and synthesize data from multiple sources in order to gain more in-depth and comprehensive understanding (Creswell, 1998). The present study examined a graduate-level blended-format course in Health Education, A555, at a large state university. The case selection was based on two main criteria: (a) students worked on a collaborative group project throughout one semester, and (b) online spaces were set up to facilitate students' online collaboration. At the time of the present study, A555 was offered through two campuses, labeled as Campus A and Campus B in subsequent sections. In terms of technology, courseware CD-ROM and a learning management system were employed to deliver learning content and facilitate online learning activities. This course included six face-to-face meetings, as well as a technology workshop at the beginning of the semester.

4.1. Participants

Forty-eight of 55 students in A555 participated in this study (34 from Campus A and 14 from Campus B). A brief study of student CMC skills showed that the participants had above average levels of proficiency in using email ($M = 4.13$, SD $= 0.43$), threaded discussion ($M = 3.55$, SD $= 0.85$), and real-time chat ($M = 3.02$, SD $= 1.04$) on a five-point scale (1 = Novice, and 5 = Expert). Regarding collaborative learning, A 555 students worked on developing a comprehensive HIV-AIDS prevention community plan. For this collaborative project, students were divided into three groups, with each group comprising four Community Planning Groups (CPGs): (a) behaviors, (b) epidemiology, (c) interventions, and (d) resources committees. As shown in Fig. 1, the group structure was hierarchical.

Among the participants, nine students were randomly selected to take part in face-to-face interviews. As shown in Table 1, all the participants were female. In terms of ethnicity, seven of them were Caucasian, one African American, and one Asian. The number of previous distance courses was varied from none to three.

4.2. Data sources and analysis

4.2.1. Collaborative learning, social presence, and satisfaction (CLSS) questionnaire

This questionnaire, originally consisting of four sections and 56 items, was developed to measure students' perceived levels of collaborative learning, social presence, and overall satisfaction:
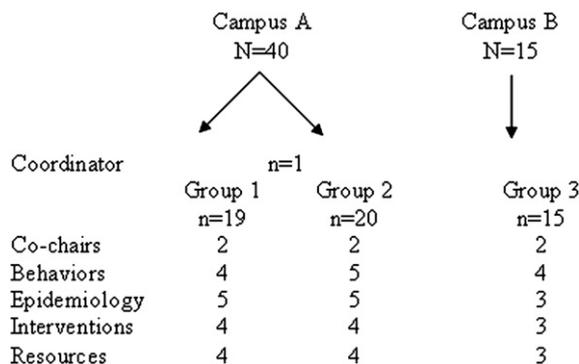

Fig. 1. Group structure and sample size.

Table 1
Background information of interview participants

Name[a]	Gender	Age	Ethnicity	No. of distance courses
Paula	F	18–25	Caucasian	1
Karen	F	18–25	Caucasian	0
Emily	F	26–35	Caucasian	1
Jane	F	18–25	African American	0
Kelly	F	26–35	Caucasian	0
Carol	F	Above 36	Caucasian	3
Sarah	F	26–35	Asian	0
Laura	F	26–35	Caucasian	0
Kara	F	26–35	Caucasian	1

[a] Pseudonyms were used to protect participants' confidentiality.

- Section 1 (General Information): Six demographic items.
- Section 2 (Satisfaction Scale): Ten questionnaire items were based on the satisfaction scale by Gunawardena and Zittle (1997). Four items were added to measure students' overall satisfaction with the course, instructor, and learning activities.
- Section 3 (Collaborative Learning Scale): Ten items were constructed to measure student perspectives on preferences to group versus individual work, and preferences to online interaction versus face-to-face interaction, amounts of collaboration, and overall satisfaction with collaborative learning, and so forth. These items were based on previous research (e.g., Driver, 2002; Kitchen & McDougall, 1998) on online collaborative learning.
- Section 4 (Social Presence Scale): The Computer-Mediated Communication (CMC) Questionnaire developed by Tu (2002) was used to measure students' perceptions of social presence on four factors: (a) social context, (b) online communication, (c) interactivity, and (d) privacy.

An exploratory factor analysis with principal component extraction was performed in an attempt to refine the instrument. Despite the small sample size, the Kaiser–Meyer–Olkin (KMO) and Bartlett's tests of sphericity tests indicated the adequacy of current data for factor analysis. After factor analysis, 12 items that did not load on any factors or highly cross-loaded on multiple factors were removed. Thus, the instrument used for the final analysis consisted of 11 items for the Satisfaction Scale, eight items for the Collaborative Learning Scale, and 17 items for the Social Presence Scale. The Cronbach's alpha coefficients were .85 for the Satisfaction Scale, .72 for the Collaborative Learning Scale, and .85 for the Social Presence Scale (see Appendix A for the CLSS questionnaire).

Pearson bi-variate correlational analyses were performed to calculate the linear relationships among collaborative learning, social presence, and satisfaction variables. Then, a stepwise multiple regression approach was conducted to identify critical factors for predicting the level of student satisfaction with distance courses. For statistical analysis, the scatterplots of residuals were examined to check assumptions of normality, linearity, and homoscedasticity. No violations were found. A standard convention level of $p < .05$ was used for evaluating statistical significance of all the quantitative analyses performed in this study.

4.2.2. Face-to-face interview

The interview questions were open-ended to allow the researcher to explore issues raised by the participants. Some of the questions included: What were the major differences of collaboration with classmates between traditional and distance courses? How important was collaboration with classmates to your satisfaction with this course? What would have improved your collaboration with classmates? Interview data were transcribed and entered into the ATLAS.ti.5.0. The researcher identified main code categories (code families) and sub-codes during the process of analyzing interview transcripts. For member checks, the researcher provided interviewees with transcripts to review and approve before analyzing interview data. This process served to ensure that the transcribed interviews were accurately recorded to capture the participants' points of view. Once the interview data were analyzed, the written findings were shared with interviewees.

4.3. Procedures

Students were asked to complete the CLSS questionnaire at the end of the semester. Student profiles were developed based on their responses. The profile consisted of an individual student's average scores in the following three categories: (a) overall perception of collaborative learning, (b) overall perception of social presence, and (c) overall perception of satisfaction. The mean scores of each participant were rank-ordered and divided into high, medium, and low level groups. Students with different levels of collaboration, social presence, and satisfaction were identified from the student profile. Random numbers were then assigned to each student. Nine students were asked to participate in face-to-face interviews. To have an equal percentage of student samples across two campuses, six students from Campus A and three students from Campus B were recruited. Each interview took approximately 50–60 min.

5. Results

5.1. Relationships

Pearson's product-moment correlation coefficients were calculated to find statistical relationships among students' perceived levels of collaborative learning, social presence, and satisfaction. Table 2 below shows the correlation coefficients of the three relationships. First, a statistically positive relationship was found between collaborative learning and satisfaction scores ($r = .41$, $p < .01$), indicating that students who reported high levels of collaborative learning tended to be highly satisfied with A555 as well. Approximately 16% of the variance in the perception of student satisfaction was accounted for by the perception of collaborative learning. Second, the relationship between collaborative learning and social presence was statistically significant with $r = .31$ at .05 level. This correlation revealed that students who reported high levels of collaborative learning tended to perceive high levels of social presence. Finally, a positive correlation of .22 was found between social presence and overall satisfaction with the course, but this relationship was not statistically significant.

Data regarding general characteristics of participants were analyzed to examine whether (a) age, (b) computer competency, (c) number of distance courses taken prior to A555, (d) preference to individual learning, and (e) amount of collaboration in groups were related to the perceived levels of satisfaction, collaborative learning, and social presence. There were three statistically significant relationships. First, the perceived levels of student satisfaction were positively related to student ages with $r = .32$ ($p < .05$), indicating that older students were more likely to have higher levels of satisfaction than younger students. Second, the number of distance courses that students took prior to A555 was positively associated with student perceptions of satisfaction ($r = .30$, $p < .05$). This relationship revealed that students who had taken more distance courses tended to have higher satisfaction levels than those who had taken fewer distance courses. The last significant relationship was found between social presence and preference to individual learning with $r = -.39$ ($p < .01$). This negative correlation indicated that the participants who preferred to work individually rather than working in a group perceived lower levels of social presence than those who reported a preference for group learning.

Table 2
Pearson's correlation coefficients

Variables	Satisfaction	Collaborative learning	Social presence
Collaborative learning	.40[**]	–	.31[*]
Social presence	.22	.31[*]	–
Satisfaction	–	.40[**]	.22
Age	.32[*]	.06	.09
Computer competency	.14	−.05	.10
No. of distance courses	.30[*]	−.07	−.03
Preference for individual learning	−.03	−.09	−.39[**]
Amount of collaboration	.14	−.05	.04

[*] $p < .05$, two-tailed.
[**] $p < .01$, two-tailed.

Multiple regression analysis was performed to further examine the relationships among the three variables under examination. The next step was to investigate whether the student perception of satisfaction with distance courses could be predicted with the variables examined in this study. The seven variables entered in the stepwise regression analysis were: (a) perceived level of collaborative learning, (b) perceived level of social presence, (c) age, (d) number of distance courses prior to A555, (e) level of computer competency, (f) preference for individual learning, and (g) amount of collaboration. Table 3 summarizes the results of the stepwise multiple regression analysis, including the unstandardized regression coefficient (B), the standard error ($SE\ B$), the standardized regression coefficient (β), the intercept, R^2 and adjusted R^2. The multiple regression analysis shows that the degree of satisfaction could be predicted with two variables: the perception of collaborative learning and the number of distance courses. Although previous correlation analysis showed that age was significantly related to the level of satisfaction with $r = .32$ ($p < .05$), the stepwise regression analysis revealed that age was not a significant predictor. The rest of the variables entered did not significantly contribute to predicting student satisfaction with distance learning. The first model shows that student satisfaction can be predicted by the perceived level of collaborative learning, which explains 16% of the variance ($R = .39$, $F(1, 46) = 8.45$, $p < .01$). The second model with two predictors indicates that approximately 10% of the variance was increased by adding the second predictor, the "number of distance courses." Therefore, it was concluded that the two-predictor model was appropriate for predicting the level of student satisfaction with distance learning ($R = .51$, $F(2, 45) = 7.93$, $p < .05$). Altogether, 26% (23% adjusted) of the variability in the perceived level of satisfaction with distance courses was predicted by knowing scores on the level of collaborative learning and the number of distance courses.

5.2. Critical factors

Interview scripts were analyzed to identify themes of critical factors affecting student perceptions of collaborative learning, social presence, and satisfaction. This paper focuses on the three most critical factors associated with student perceptions of satisfaction, collaborative learning, and social presence. These are (a) course structure, (b) emotional support, and (c) communication medium.

5.2.1. Course structure

A555 had multiple components which were well organized and structured in order to enhance student learning. Student perceptions regarding the course structure positively affected their overall satisfaction with the course. Students mentioned that they were satisfied with the following course components:

Table 3
Summary of stepwise regression analysis for variables predicting student satisfaction with distance course

Variable entered	B	SE B	β
Model 1			
Collaborative learning	.36	.13	.39
			Intercept = 2.47
			$R^2 = .16$
			Adjusted $R^2 = .14$
			$R = .39$**
Model 2			
Collaborative learning	.38	.12	.42
No. of distance courses	.10	.04	.33
			Intercept = 2.26
			$R^2 = .26$
			Adjusted $R^2 = .23$
			$R = .51$*

* $p < .05$.
** $p < .01$.

- *Technology*: CD-ROM and course management system.
- *Collaborative learning*: authentic project and weekly discussion forums.
- *Face-to-face interaction*: classroom meetings.
- *Evaluation*: peer evaluation and online exams.

A number of students expressed that A555 was a well-organized course. For instance, when asked about the major difference between previous distance courses and A555, Carol described A555 as being structured with multiple components:

> It seemed to be multi-structured. You had the CD-ROM. You had lectures like there. We met about every three weeks. Besides, we had a group project. We had to participate in discussion forums twice a week. We had to have a certain timeframe. (Carol)

Students perceived that all the components provided a balance between individual learning (CD-ROM) and collaborative learning (group project) and also a balance between responsibility and flexibility.

While the majority of the participants were satisfied with the course structure, two students mentioned that there should have been a better integration between the CD-ROM and group project. Kelly expressed that it would have been beneficial to discuss what students learned from the CD-ROM lessons and how the new knowledge could be applied to completing the HIV program planning project as shown in the excerpt below:

> Overall, I wanted a better integration between the CD-ROM and the prevention plan that we were putting together. It seemed like the group project was done without much integration of the CD-ROM. The CD-ROM itself was a great tool and taught you all these things. But there wasn't a necessary application from the CD-ROM to the group project we were doing. That felt a little bit strange. (Kelly)

5.2.2. Emotional bonding

A number of participants regarded the degree of emotional bonding with group members as being an important factor for their perception about social presence and collaboration. Group members not only shared knowledge and skills to support each other, but also established the sense of connectedness in the process of completing the group project. Paula mentioned that the group project was a bonding experience to get to know each other for the whole class:

> Since A555 was our first class together, it was almost a bonding experience between us. We got to know these five group members. In my group, we got to know each other right away. Now we see each other on campus. We have an instant bond because we did this group thing together. (Paula)

As another example, Emily's case shows how she was emotionally connected with her group members. She was a student who tended to be shy in traditional classroom environments, and had some unpleasant collaborative learning experiences in the past. In A555, Emily was highly satisfied with her experience in the group project because she felt connected with group members. Additionally, it appeared that the level of social presence increased students' levels of participation. It was interesting to find that the feeling of connection established from the group project went beyond to other classes. Students continued to interact with the same group members in other courses or outside of classes as well. Jane made an interesting comment that she was able to know classmates better in a distance course than in a traditional lecture-type class:

> We missed each other. A couple of us took courses together. I only see them once a week this semester. We actually did get to know each other. In distance learning courses, you actually do get to know people more when you are working in a group. In a lecture once a week, we don't really talk to people. (Jane)

However, while it was clear that the sense of emotional bonding played an important role in increasing the level of social presence, two students, Paula and Karen, pointed out that there might be an optimal level of social presence which positively affects collaborative learning. In other words, they implied that high levels of the feeling of connection could create a negative impact on the collaborative learning process. For example,

Paula described a situation where all the group members were close friends, and tended to be off–task and socializing:

> Knowing someone can be easier because we know their personality. If you are friend with them, you can work well together. At the same time, if you have a group where we are all kind of friends and know each more closely, it can take away a lot of time because when we get together, we do want to chat more at the personal level, and not just get to work. Because I had that group that we were all friends before, it ended up being a more social time. We were not very productive with actual group work. (Paula)

5.2.3. Communication medium

Several students mentioned that the communication medium was an important factor that affected their level of social presence in a distance learning environment. Several students perceived that online communication medium had limited capacity for creating a level of intimacy and immediacy. Laura, for instance, expressed that online forums are mechanical, and it was difficult to have social interaction with others: "Forums are definitely more focused. Then you lose part of 'Hey, how are you?', 'how's your day?' that kind of information with your group members." Another effect of the communication medium was on writing styles. It appeared that the communication medium influenced the level of formality in students' writing styles. Students tended to make sure that their messages were polite when they were discussing sensitive topics. As an example, Kelly mentioned said: "it took a lot of time to think about the most text way of saying what I wanted to say without seeming rude."

With regard to the use of CMC technology, it was apparent that students who tended to be shy in traditional classroom environments liked the asynchronous communication channel with the instructor more than those who were vocal and active in classrooms. For instance, Sarah mentioned that while it was difficult to ask questions in classroom situations, she felt relatively comfortable asking questions of the instructor via email:

> I'm a shy student. I cannot raise my hand in class and ask a question. I can't ask and participate in class discussions at all. If I felt anything was difficult, I emailed him and asked him. (Sarah)

Paula, however, provided a different perspective. While there were ways to synchronously interact with the instructor and classmates via synchronous chats and face-to-face meetings, she felt the limited capacity of the communication delivery method of the distance learning format. She perceived that the asynchronous communication method was not as effective as the traditional classroom approach which allowed instant feedback and peer interaction. When asked about the overall satisfaction with A555, Paula said:

> I was probably less satisfied than other classes just because I like student–teacher interaction and interaction with my peers . . . If you are watching the lesson and we had questions about something, you could not raise your hand. You have to email. So I personally prefer having regular classes as opposed to distance learning . . . When you are in class, somebody might have questions that you did not even think of. They ask the questions in class and you feel that, "Oh, that's a good question." (Paula)

6. Discussion and conclusion

The purpose of this study was to examine students' perceived levels of collaborative learning, social presence, and satisfaction in a distance learning environment. The first research question was "what are the relationships among collaborative learning, social presence, and satisfaction in a distance learning environment?" As shown in Fig. 2, students who perceived high levels of collaborative learning tended to be more satisfied with their distance course. Two explanations are possible for this positive relationship between collaborative learning and satisfaction. The first explanation is related to students' learning expectation and learning level. Participants were graduate students who were pursuing a professional degree in public health education. Students wanted to prepare themselves for their future work environments, and the collaborative project was designed for such authentic learning experiences by providing opportunities to deal with real data and populations for the development of a comprehensive HIV-AIDS prevention plan. Thus, the level of learning that
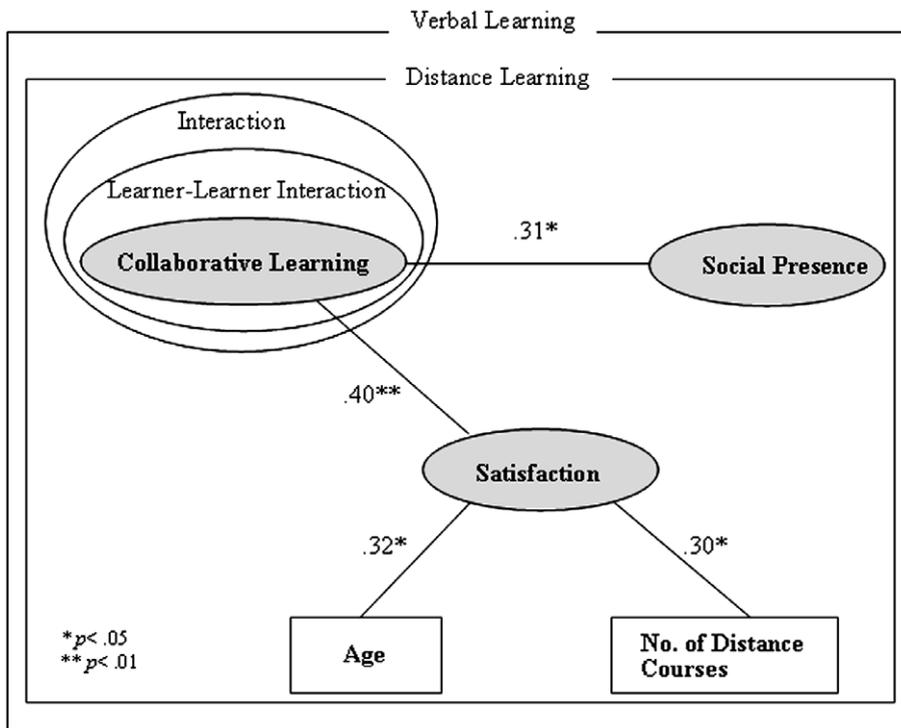
Fig. 2. Relationships among collaborative learning, social presence, and satisfaction as found in the present study.

students achieved from the collaborative learning project met their learning expectations with A555. This speculation is congruent with the Carr-Chellman et al.'s (2000) finding that collaborative learning based on authentic problems can be successful when students are advanced in their studies and want to prepare themselves for the challenges of authentic experiences. Another explanation is related to the fact that the collaborative project was a major component in A555. The collaborative project was a graded and required component, accounting for approximately 25% of the total assignment point. Face-to-face interviews revealed that students' positive experiences with the collaborative project greatly influenced their perceptions of A555. A number of students mentioned that they had a positive view of the course because they enjoyed working with group members and received a high grade on the group project.

The next relationship of concern with collaborative learning and social presence was that students with high perceptions of collaborative learning also perceived high levels of social presence. This positive relationship between collaborative learning and social presence is supported with qualitative data as well. Several participants during face-to-face interviews mentioned that their feeling of closeness and connectedness with group members greatly affected their willingness and motivation to engage in the group project. While there is no previous research which specifically examined the statistical relationship between the two variables, this finding supports an argument made by several researchers, which suggested that psychological distance and social interaction play an important role in online collaborative learning (Moore, 1991; Russo & Benson, 2005; Shin, 2002).

To understand the reason for this positive relationship between collaborative learning and social presence, it is important to note how the feeling of connection and closeness with other students affects individual motivation to engage in academic activities. Generally, the present study found that a feeling of connection positively affected students' self-motivation. When students have difficulty creating the appropriate level of mutual closeness, trust, and interdependence, their participation in group projects is likely to be low. A qualitative study by Vrasidas and McIsaac (1999) confirms this speculation about the relationship among social presence, student participation, and self-motivation. They found that students were reluctant to participate

in online collaborative learning because they lacked a feeling of connection and this affected overall motivation. Additionally, this speculation is consistent with the argument of Rourke et al. (1999) that social presence is a critical factor in developing a successful community of inquiry, and that students need to feel a sense of belonging and trust in order to recognize collaboration among students as a valuable learning experience.

Surprisingly, this study found that the relationship between social presence and satisfaction was positive but statistically insignificant. This was an unexpected result since prior studies reported a strong relationship between the two variables (Gunawardena & Zittle, 1997; Richardson & Swan, 2003). While the present study did not specifically examine why the level of social presence was not significantly associated with student satisfaction, speculations are possible. First, it is important to understand that while students in the previous studies were required to regularly participate in online discussions and interact with classmates, student participation in online interaction was voluntary in A555. Additionally, students in this course were able to meet face-to-face with other students. It seems that students did not feel a strong need to engage in online social interaction since they had opportunities for face-to-face interaction. Therefore, it is possible that students had limited opportunities to develop the sense of social presence through online communication technology, and their view of social presence did not greatly influence how they evaluated their overall satisfaction with the course. Another possible explanation is related to issues of the operational definition and measurement of social presence. While Gunawardena and Zittle (1997) measured the immediacy aspect of social presence, this study measured social presence from a broader perspective, including interaction, online communication, and privacy factors. This may imply that social presence is a complex concept, and its effect on affective learning outcomes should be further examined. Moreover, this finding suggests that systematic research on social presence necessitates the operational definition of the term with a strong theoretical base.

Relationships among the characteristics of the participants were also examined. The significance of the age factor could be associated with the fact that this research included a high percentage of students who were female, worked full-time, and had family responsibilities. Those students might enjoy the flexibility of distance education more than those who were traditional full-time students. The number of previous distance courses positively affected students' perceived levels of satisfaction with this distance course. Participants with previous distance education experiences compared their prior distance courses and A555. For instance, three students expressed their high satisfaction with A555 compared to their previous distance courses. Those participants seemed to have had a low expectation with A555 as a distance learning format at the beginning because they encountered some difficulties in their previous distance courses, such as technical problems, lack of synchronous communication, and unorganized course structure. It was obvious that their previous experiences affected how they evaluated their satisfaction with A555. Another possible explanation for this is that students with prior distance learning experiences are likely to be more comfortable and knowledgeable with CMC technology as an instructional delivery method than those who are new to the distance education format.

The second research question was to identify critical factors affecting students' perceived levels of collaborative learning, social presence, and satisfaction. While the researcher in this study expected to hear some negative voices, student comments were highly positive, indicating their high satisfaction with the overall learning experience in A555. Overall, it appeared that (a) the course structure, (b) emotional support, and (c) communication medium were the most critical factors associated with student perceptions of the three variables examined in this study. First, it was apparent that the course structure influenced student perceptions of collaboration, social interaction, and satisfaction. Requiring collaborative learning activities led to more interactions among students, and increased their perceived feelings of connection with other students. This finding supports Vrasidas and McIsaac (1999) who suggested that "requir[ing] students to engage in discussions and collaborate on projects increased interaction in the course. Therefore, increased structure led to more dialogue and interaction" (p. 32). However, this result contradicts Moore's (1991) transactional distance theory which proposes that increasing structure in distance education is likely to decrease dialogue and increase transactional distance. We speculate that the contradicting results are due to the examination of different types of interaction. While Moore focused on the influence of instructor–learner interaction, the current study investigated learner–learner interaction. This study argues that structure associated with collaborative learning may increase dialogue and interaction among students in distance learning environments.

Secondly, emotional support among students was a critical factor. The social relationships established from collaborative learning projects enabled the development of affective support and feelings of connection. Moreover, social interaction with group members provided motivation for student participation and learning in the group projects. The importance of emotional bonding and support has been emphasized by several researchers who examined the development and design of online learning communities. When describing a successful online community, Lally and Barrett (1999) and Vrasidas et al. (2004) mentioned the following characteristics of socio-affective support:

- There is mutual support among group members and sub-groups.
- Capable moderators provide facilitation, guidance, and support as needed to the members of the community.
- There is the provision of opportunities for socio-emotional discourse exchanges and collaborative learning frameworks.
- Online learning community should be an environment where students can receive peer support and exchange multiple perspectives.

In fact, those characteristics were present in A555. Through the hierarchical structure (instructor → course coordinator and discussion facilitators → co-chairs → students), moderators with more experiences with distance education and course content facilitated the collaborative group project and online discussion forums, and provided necessary emotional support to those who expressed concerns and dissatisfaction. Additionally, the collaborative learning project gave students opportunities to be familiar with other classmates and to feel connected with them. Overall, this finding implies that emotional support is needed to reduce students' sense of distance with each other, and distance learning environments should be designed to provide such socio-affective interaction among students.

Finally, the communication medium was an important factor affecting students' perceptions of collaboration, social presence, and satisfaction. While CMC technology is often regarded as impersonal and formal due to the absence of non-verbal and relational cues, recent research studies have found that a sense of learning community and an appropriate level of social presence can be promoted and cultivated in CMC environments (Stacey, 2002). Overall, participants in this study rated the use of instructional and communication technology to be effective. However, a number of students mentioned the absence of immediate feedback and synchronicity as negative aspects of the course. This finding suggests a need to incorporate two-way synchronous communication channels that permit more immediate responses and visual/audio cues in order to compensate for the lack of synchronous interaction among distance students.

The present study provides several implications for instructional design in terms of how to design a collaborative distance learning course for minimizing psychological distance and increasing student satisfaction. Findings indicate that students tend to be satisfied with their overall learning experiences (a) when distance courses include *balanced* and *multi-structured* learning components including opportunities for online and offline interaction, and (b) these components are designed to promote *collaborative–social interactions*. Therefore, practitioners who are interested in designing collaborative and socio-affective learning environments should carefully consider how they structure and balance several course components. The following considerations may be taken into account when designing a distance course:

- *Learning activities*: In addition to individual assignments, design one or two collaborative projects to provide students with opportunities to work with classmates. The projects should include authentic and problem-based tasks to help students see the relevance and meaningfulness of their learning.
- *Communication*: Provide both synchronous and asynchronous CMC tools to minimize communication barriers. Instructors can employ a variety of 'get-to-know' activities to increase the initial level of social presence. Instructors' modeling and scaffolding of social presence behaviors might be needed for students who are new to distance learning.

Additionally, this study found that a blended learning format can be a viable option to decrease psychological distance and increase student satisfaction. Several considerations, however, should be taken into account before incorporating blended learning approaches. First, it is obvious that the blended format is probably not feasible in

distance learning contexts where a high percentage of students work full-time and live in geographically different areas. In these cases, utilizing two-way interactive computer technology may be a more effective way to compensate for the lack of face-to-face interaction. Second, instructors and instructional designers should carefully design which course components should be delivered online and in class. Blending computer-based components with face-to-face instruction may provide students with more opportunities to interact with learning contents, peers, and instructors. Nonetheless, it is also possible that new problems are generated when multiple components are not well integrated into the overall course design (Clark & Mayer, 2002; Parkinson, Greene, Kim, & Marioni, 2003). Combining classroom and online activities is only a small step in blended learning. Thus, instructors and instructional designers should invest more time and effort on the analysis of learners, learning contents, contexts, and technologies to design an effective blended learning course.

In conclusion, the current study revealed that the student perception of collaborative learning is related to social presence and overall satisfaction in a distance learning environment. While the effect of psychological distance and the importance of social interaction have been studied by several researchers, the concept of social presence has rarely been studied in distance learning contexts. Thus, this study has an importance in demonstrating a posited assumption regarding the relationships between collaborative leaning and social presence with supporting data. However, it should be noted that misused or overused activities designed to promote student interaction may negatively affect students' learning. Thus, it is important for instructional designers and distance educators to carefully design distance courses to provide students with meaningful opportunities for collaboration and social interaction.

Appendix A. The collaborative learning, social presence, and satisfaction (CLSS) questionnaire

Instructions: This questionnaire is designed to measure your perceptions on the level of collaborative learning, social presence, and satisfaction. There is no right or wrong answer for each question. However, it is important for you to respond as accurately as possible by checking the most appropriate response.

SECTION 1. GENERAL INFORMATION

1. What is your gender?
   __ Female
   __ Male
   __ Not applicable

2. What is your age?
   __ under 18
   __ 18–25
   __ 26–35
   __ 36–45
   __ Above 45
   __ Not applicable

3. What is your predominant ethic background?
   __ Caucasian
   __ African–American
   __ Latino
   __ Asian/Pacific Islander
   __ Other
   __ Not applicable

4. Please estimate your level of computer expertise.
   __ No experience
   __ Novice
   __ Intermediate
   __ Expert
   __ Not applicable

5. How many distance courses have you taken so far? Please circle the number.
   0 1 2 3 4 5 6 7 8 9 10 more than 10

SECTION 2. SATISFACTION

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I was able to learn from Oncourse discussions.	1	2	3	4	5
2. I was stimulated to do additional readings or research on topics discussed in Oncourse.	1	2	3	4	5
3. Discussions assisted me in understanding other points of view.	1	2	3	4	5
4. As a result of my experience with this course, I would like to take another distance course in the future.	1	2	3	4	5
5. This course was a useful learning experience.	1	2	3	4	5
6. The diversity of topics in this course prompted me to participate in the discussions.	1	2	3	4	5
7. I put in a great deal of effort to learn the Computer-mediated communication system to participate in this course.	1	2	3	4	5
8. My level of learning that took place in this course was of the highest quality.	1	2	3	4	5
9. Overall, the learning activities and assignments of this course met my learning expectations.	1	2	3	4	5
10. Overall, the instructor for this course met my learning expectations.	1	2	3	4	5
11. Overall, this course met my learning expectations.	1	2	3	4	5

SECTION 3. COLLABORATIVE LEARNING

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Collaborative learning experience in the computer-mediated communication environment is better than in a face-to-face learning environment.	1	2	3	4	5
2. I felt part of a learning community in my group.	1	2	3	4	5
3. I actively exchanged my ideas with group members.	1	2	3	4	5
4. I was able to develop new skills and knowledge from other members in my group.	1	2	3	4	5
5. I was able to develop problem solving skills through peer collaboration.	1	2	3	4	5
6. Collaborative learning in my group was effective.	1	2	3	4	5
7. Collaborative learning in my group was time-consuming.	1	2	3	4	5
8. Overall, I am satisfied with my collaborative learning experience in this course.	1	2	3	4	5

SECTION 4. SOCIAL PRESENCE

The following questionnaire has been developed to investigate your attitude toward Computer-Mediated Communication (CMC), including email, Threaded Discussion, and Real-Time Chat. You are to consider your course-related use of CMC only. You will be presented with a statement about CMC and then will select the appropriate response listed under each statement. The following descriptions apply to the entire questionnaire:

E-Mail: Electronic messaging system that permits communicating.

Threaded Discussion: Computer-based environments in which messages are 'posted' and read by users who may or may not be logged on simultaneously. It is required that the users must access the discussion boards to participate.

Real-Time Chat: Computer-based environments in which users communicate simultaneously.

Please read each statement carefully; then indicate the degree to which you **Agree/Disagree** with the statement as it relates to CMC, by selecting the appropriate answer.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. CMC messages are social forms of communication.	1	2	3	4	5
2. CMC messages convey feeling and emotion.	1	2	3	4	5
3. CMC is private/confidential.	1	2	3	4	5
4. CMC messages are impersonal.	1	2	3	4	5
5. Using CMC is a pleasant way to communicate with others.	1	2	3	4	5
6. The language people use to express themselves in online communication is stimulating.	1	2	3	4	5
7. It is easy to express what I want to communicate through CMC.	1	2	3	4	5
8. The language used to express oneself in online communication is easily understood.	1	2	3	4	5
9. I am comfortable participating, even though I am not familiar with the topics.	1	2	3	4	5
10. CMC is technically reliable (e.g., free of system or software errors that might compromise the reliability of your online messages reaching ONLY the target destination).	1	2	3	4	5
11. CMC allow relationships to be established based upon sharing and exchanging information.	1	2	3	4	5
12. CMC allows me to build more caring social relationship with others.	1	2	3	4	5
13. It is unlikely that someone might obtain personal information about you from the CMC messages.	1	2	3	4	5
14. Where I access CMC (home, office, computer labs, public areas, etc.) does not affect my ability/desire to participate.	1	2	3	4	5
15. CMC permits the building of trust relationships.	1	2	3	4	5
16. The large amounts of CMC messages (numbers of messages and length of messages) do not inhibit my ability to communicate.	1	2	3	4	5
17. It is unlikely that someone else might redirect your messages.	1	2	3	4	5

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