Introducing a synchronous medium in a computer-mediated distance learning course: Towards understanding how student participation is affected

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Abstract

Achieving active participation has been argued to be an intrinsic part of learning and has become a central issue in debates around online education. This research examines whether a new and emerging synchronous communication medium, instant messaging (IM), may enable students in participating more actively in a distance learning course. When comparing two offerings of the course, where the first was delivered asynchronously and the second was complemented with an IM system, results indicated that the first class operated with a higher level of participation. However, when comparing students that adopted the IM system with those that did not it was found that the adopters operated with a higher level of participation. Since the results are tentative, the paper is concluded by calling for further research that tests the results of this study in both similar and different contexts.

Keywords

distance learning, participation, computer-mediated communication, synchronous communication, instant messaging

Introduction

Computer-mediated communication (CMC) has supported work groups for more than twenty-five years (Hiltz & Turoff, 1978). Currently, the most obvious trend when studying research on information and communication technology and its relation to education, is the increased interest in using various forms of CMC for interpersonal communication (Maor, 2003). Students have social needs and, thus, interacting with others motivates them (Münzer, 2003). Moreover, according to Johnson and Johnson (1999), "the degree of emotional bonding that exists among students has a profound effect on the quality of work performed" (1999, p. 206). This recognition of the social needs of learners has led to a shift in research from individually centred towards more socially oriented learning environments (Hung, 2001). Many researchers (e.g. Bober & Dennen, 2001; Brown, 2000) seem to agree that social and informal communication between learners is an essential element of learning environments. When learners interact with each other, they learn from each other and share personal perspectives which help them to validate their own viewpoints while being exposed to, and coming to understand, other positions (Bober & Dennen, 2001; Bowden & Marton, 1998). However, a lack of informal communication has been reported, which is unfortunate since it is "particularly important for creating bonds of community and group identity" (Haythornhwaite, 2001, p. 214).

Technologies include different degrees of formality and those that demand a high degree of formality can disrupt informal relations. Brown and Duguid (1998) argue that technologies which include a high degree of formality "leave little room for the informal, the tacit, and the socially embedded, which is where know-how lies and important work gets done" (p. 105). Virtual learning environments (VLE) used in blended and distance education such as Blackboard and WebCT, have been questioned since these are designed to support formal communication (Beuschel, Gaiser & Draheim, 2003; Britain & Liber, 2004; Contreras-Castillo et al., 2004). For example, a date and time has to be decided upon when using synchronous chat systems, and students may in some cases feel inhibited from contributing in asynchronous discussion boards since contributions can be accessed by all participants including the teacher (Contreras-Castillo et al., 2004). Informal communication is more spontaneous (Beuschel et al., 2003) since it "[takes] place at the time, with the participants, and about the topics at hand" (Fish, Kraut & Chalfonte, 1990, p. 2). Instant messaging (IM) systems, which are discussed more thoroughly in the next section, have been reported to better support social and informal communication in distance learning: "In traditional classroom buildings, the common spaces such as hallways provide the venue for this informal communication; IM services can enhance the distance learning environment by providing the 'virtual hallways' for students and instructors to meet" (Nicholson, 2002, p. 363). In this study, it is examined whether the introduction of an IM system will result in students participating more actively:

> How will the possibility to communicate synchronously via an IM system affect student participation in a distance learning course?

The importance of active participation by learners is often emphasized in the literature (Wang, Sierra, & Folger, 2003). Active participation has been labelled "the online challenge" (Bento & Schuster, 2003) and has been reported to improve learning, which is discussed in the theoretical framework. Moreover, participants that interact interpersonally have been argued to be less likely to drop out (Münzer, 2003; Schweizer, Paechter, & Weidenmann, 2003), which especially is a problem reported in distance learning courses (Carr, 2000; Rovai, Wighting, & Lucking, 2004).

The paper is organized as follows. First, findings from research on synchronous communication and IM use are briefly discussed. This is followed by the theoretical framework and the methodology that were relied upon when analysing students' use of IM. Then, the results of the study are described. Finally, an analysis is followed by the main conclusions.

Synchronous communication and instant messaging

Instant messaging is an example of a synchronous communication medium. Synchronous communication media make it possible to communicate in real-time. In educational settings, such media have been the basis of relatively few studies in comparison with asynchronous media (Hrastinski, 2005b). When university classes supported by synchronous CMC have been compared with conventional ones, it has been reported that most members contributed to discussions and also an overall increase in participation (Leidner & Jarvenpaa, 1995). Even though there are many advantages with communicating synchronously, asynchronous media are more popular.

According to Fish and colleagues (1990), technology for informal communication should provide the following characteristics: (a) access to a suitable population of others; (b) an environmental mechanism that brings people together; (c) the effort needed to initiate and conduct a conversation should be low; and (d) a visual channel. Interestingly, most available IM systems, both commercial ones and those designed for collaborative knowledge work (e.g. MSN Messenger, Lotus Workplace Messaging), have these characteristics:

> An IM service consists of a small program that runs in the background on the user's computer that is connected online to a central hub program elsewhere on the Internet. Other users are connected to the same hub and are running similar client software. In order to communicate, a user accesses a predefined list of names of other users running the software [e.g. list of students and teachers in the course] … and initiates an IM session. The user then enters a short message, which is sent to … the recipient of the message. The recipient can respond to the message either with a brief response or by opening a chat window [or in some cases whiteboard, audio- or videoconferencing window] for an extended conversation. (Nicholson, 2002, p. 364)

It has been predicted that corporate use of IM systems will grow from 18.3 million in 2001 to 229 million users in 2005 (Cameron & Webster, 2005). Since both work groups and learning groups "share the problem of creating and sustaining a positive work and learning environment" (Haythornthwaite, 2000, p. 201) IM systems may also be useful in educational settings. However, so far, few studies have examined the use of IM systems in such settings. There are some notable exceptions (e.g. Contreras-Castillo et al., 2004; Nicholson, 2002).

Theoretical framework

Below, the importance and challenge of examining participation is briefly discussed. Then, social network analysis (which may be suitable when analysing how the IM system was used and affected student participation) is outlined. By adopting a social network approach it has been possible to survey how students' social networks are affected when IM is introduced.

Learning as participation in the social world

Learning as participation in the social world is at the core of Lave and Wenger's (1991) theory of learning. Wenger (1998) refers to participation as "a process of taking part and … the relations with others that reflect this process" (p. 55). Moreover, Wenger argues that it is a complex process that combines doing, talking, thinking, feeling and belonging. When participation is being analysed in online courses it is often reduced to a measure of the number of posts or logins during a time period (e.g. Ellis, 2003). However, some argue that measuring participation is more complex (Bento & Schuster, 2003; Wenger, 1998).

One step towards a better measure of participation has been suggested by Bento and Schuster (2003) who suggest combining two dimensions, interpersonal interaction and interacting with content. When transferring Wenger's reasoning to a distance learning context it becomes clear that just counting the number of messages in an online discussion is not sufficient evidence to label some students as more active participants than others. If doing so, the researcher neglects, for example, the importance of doing, thinking (e.g. analysing), feeling (e.g. support during an upset) and belonging (e.g. feeling attached to a group). Participating in, and feeling attached to a group are dual processes. People that have a strong attachment to a group are more likely to participate and help others. Reversely, participating and helping others drive group attachment (Wellman & Gulia, 1999). Thus, when assessing participation in groups the importance of group attachment should not be forgotten.

Social network analysis

Social network analysis provides a set of techniques for understanding patterns of relations between and among people, groups and organizations (Garton, Haythornthwaite & Wellman, 1999). It has been used extensively in many disciplines such as sociology, informatics, computer science, communication science, business administration and psychology (Preece, 2000; Wellman et al., 1996). One of the most intriguing challenges in research on distance learning during the 1990s and ever since has been to understand the relations between learners (Moore, 1989). Drawing on the work of Haythornthwaite (2000; 2001), social network analysis seems particularly suitable for examining these relations. The unit of analysis is often, as in this study, the interactions between actors, which may include exchanges of information and social support. By analysing interactions, social networks emerge where particular types of exchanges connect individuals and support groups (Haythornthwaite, 2001). Social network analysis helps answer questions like who talks to whom, about what, using which media, and how these factors change over time (Preece, 2000). The advantage of the social network approach compared to other ways of analysing interactions is the possibility to empirically assess group behaviour (Haythornthwaite, 2001). Network density, which has been used when presenting the findings of this study, indicates the number of pairs connected relative to the maximum possible number of pairs in the network.

Method

In the theoretical framework, participation in online courses has been described as a complex phenomenon. Consequently, data collection was conducted both quantitatively (surveys) and qualitatively (interviews).

Research setting

A course entitled Business English Online (BEO) at Jönköping International Business School has been investigated during two subsequent offerings. Students that usually enrol can be described as computer literate adult learners, most of them working and some living abroad (Soames, 2004). The course involves group discussions, and continuous assessment of individual and group work. Ever since the course was first offered in 2001, it has been delivered asynchronously and participants have communicated mainly via e-mail and discussion boards. However, there have been exceptions since some students voluntarily chose to communicate synchronously (face-to-face, telephone, IM) with fellow students and the teacher. In 2004, which was the fourth offering of BEO, an IM system was introduced and associated with an introductory activity that was mandatory. The system was introduced to better support synchronous and informal interaction between students. In this study, the third offering (Fall 2003) of the course will be compared with the fourth one (Fall 2004) with the aim to evaluate the introduction of the IM system and its affect on participation in the course. Moreover, students in BEO 04 that adopted the IM system will be compared with those that did not.

Data collection

Two questionnaires were designed to collect descriptive statistics. The first questionnaire aimed to collect data on BEO 03 students' sense of participation and social networks. The second one, distributed to BEO 04 students, also examined prior usage of IM systems. Thus, the questionnaires made it possible to investigate how the introduction of the IM system affected participation and for what kinds of exchanges between whom the system was used as compared with other media.

Drawing on the work of Haythornthwaite (2000), both questionnaires contained questions on "how often [e.g. daily, weekly, monthly] they had engaged in the following types of exchanges with each other member of the class: (1) collaborating on class work; (2) giving or receiving information or advice about class work; (3) socializing; and (4) giving or receiving emotional support (described as help in a minor or major upset)" (p. 202).

For each type of exchange the students were asked to indicate which means of communication were used. In order to assess the impact of IM on a distance learning course, students and teacher's full set of social ties were surveyed (Cummings, Butler, & Kraut, 2002). Therefore it was decided to collect data not only on the usage of IM, but all means of communication since IM may affect use of other media. In order to compare IM adopters and non-adopters, students were divided into two groups based on frequency of communication. The following frequency estimates were used (the course lasted for about two and a half months): "Daily communication was scored as 20, daily to weekly as 12, weekly as 4, weekly to monthly as 2.5, and monthly as 1" (Haythornthwaite, 2001, p. 215). Total frequency of interaction for a student was taken as the sum of the frequencies of interaction via each medium and exchange. The self-reported frequency is not believed to be objectively accurate, but will let us compare different frequent communicators' use and opinions of the IM system. Adjustments were made for the missing questionnaire data by taking the responses others gave for interaction with the student during the time period (Haythornthwaite, 2001).

In both questionnaires, a measure on students' sense of participation was included. Using this measure, it was possible to compare whether participation in BEO 04, where an IM system was used, was higher than in BEO 03. It consisted of the following items: (1) I felt like the class worked together; (2) I felt that the class included social interaction; (3) As a student, I felt part of the class; (4) I felt comfortable interacting with other participant(s); (5) Computers depersonalize communications and social relationships (reverse-coded); and (6) As a student, I felt personally involved in the course. The measure complemented data on social networks. The measure was adapted from a questionnaire initially developed by Webster and Hackley (1997) and complemented with additional items from Haythornthwaite (2000).

The BEO 03 students consisted of three males and thirteen females. The BEO 04 students consisted of five males and nine females. Their mean age was 31 years with ages ranging from 24 to 42 years. Response rates were 88 % for class BEO 03 (14 out of 16 students), and 93 % for class BEO 04 (13 out of 14 students). Overall response rate was 90 % from 28 respondents. One of those was the teacher, responsible for both BEO 03 and BEO 04. She was only asked to submit social network data since the study examined IM from a student's perspective.

Six interviews, which lasted for about half an hour, with students from BEO 04 were recorded and transcribed. Each transcribed interview was sent to the respondent for approval. The aim was to get a richer view of how the IM system was used compared with other communication media and how IM use may affect student participation. Three persons that were classified as adopters and three that who not were chosen to be interviewed. The interviews were conducted via telephone since the students were geographically dispersed. When interviews are to be carried out in a fairly short period of time, Yin (2003) suggests using focused interviews. However, he states that: "the interviews may still remain open-ended and assume a conversational manner" (p. 90). Consequently, an interview guide that contained quite broad questions was used.

Results

Based on the second questionnaire and interviews, the first section describes how students in BEO 04 used IM, including comparisons with other means of communication. Then, data from the questionnaires on student participation are compared for BEO 03 and BEO 04, and for IM adopters and non-adopters.

Overall communication patterns

By examining the overall pattern of IM use, students were divided into two groups, IM adopters and non-adopters (Chen, Yen, & Huang, 2004). As discussed in the method, frequency estimates were used. When analysing the frequencies, seven students were clustered around low frequencies, which ranged between 0 and 20 (see Table 1). These were labelled non-adopters and the remaining seven students were labelled adopters. As displayed in Table 1, the mean frequency of communication was 43 for the IM adopters and 7 for the non-adopters. The students' IM experience was measured as the number of years of claimed IM use (Chen et al., 2004). As displayed in the table, the adopters had more experience of IM.

Table 1: Frequency range, mean frequency and number of years of IM usage

	Frequency range	Mean frequency	IM use (years)
IM adopters	26-64	43	1.8
IM non-adopters	0-20	7	1.2

In Figure 1, IM communication is illustrated. During the first part of the course students were expected to complete two group projects. The initial letter denotes which group each student belonged to; there were four groups (A–D). In group A, there were two students and in the other groups there were four students. The teacher (T) mainly communicated asynchronously, via e-mail and the discussion board, with students. By interpreting the figure, it is apparent that the IM system was mainly used for communication within the groups.

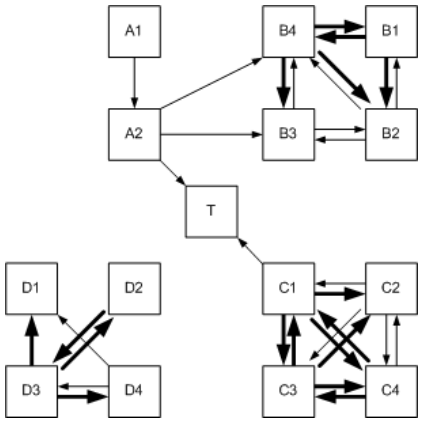

Figure 1: IM network — all relations, communication frequency at least one time (thin arrow) and at least ten times (thick arrow)

The most commonly used communication media in the BEO 04 class at least weekly were e-mail followed by discussion board, and at least monthly e-mail followed by IM (see Table 2). Surprisingly, the students often did not report the frequently used class-wide discussion boards as communication with peers. The IM system was primarily used for collaborating on class work and giving or receiving information or advice about class work within the groups. Moreover, it was used as a complement to rather than replacement of e-mail.

We have had some projects where you have worked in groups and then we have used [IM] a bit to decide when and where and how we should organize our work. Then, after that we have maybe used the mail. We have mainly used the mail to send stuff but we have organized work by using [IM] (Interview B4, IM adopter).

Table 2: Network densities by class and type of exchange for communication via discussion board, IM, e-mail and all media

		BEO 03				**BEO 04**			
		CW	**IE**	**SO**	**ES**	**CW**	**IE**	**SO**	**ES**
Weekly	Diss board	0.14	0.15	-	0.01	-	0.08	-	-
	IM	0.01	0.01	0.01	0.01	0.03	-	-	-
	E-mail	0.10	0.14	-	0.03	0.05	0.09	-	-
	All	0.15	0.32	0.04	0.07	0.09	0.18	0.02	0.01
Monthly	Diss board	0.25	0.19	-	0.01	-	0.08	-	-
	IM	0.02	0.01	0.02	0.01	0.13	0.10	-	-
	E-mail	0.20	0.18	0.03	0.04	0.17	0.22	-	-
	All	0.38	0.40	0.08	0.09	0.32	0.41	0.02	0.01

CW = Collaborative work; IE = Information exchange; SO = Socialize; ES = Emotional support

One reason for the fairly low network densities on IM communication is that many students wanted to work individually, which seemed to be the underlying reason for choosing a distance learning course. Drawing on previous research on IM, it was expected that students would report a high level of social support. However, most students themselves chose not to communicate socially and simply did not express a need for such exchanges:

> I didn't have a need to socialize with others in this course. I felt that I wanted to complete the credits and I wanted to do it by myself. I wasn't interested in group work. (Interview A2, IM non-adopter)

One woman (B3) who liked communicating socially via IM with friends and had done it frequently for 4.5 years did not want to communicate socially with other students: "When I use [IM] normally it is only socially and that is maybe why I hesitated since I don't have that relation to any of these people I never have met" (Interview B3, IM non-adopter). Also, the class did not seem to have achieved the critical mass (Markus, 1987) needed to get communication via the IM system started since most students reported that others seldom were online.

IM usage and its effect on participation

The research question, how the possibility to communicate synchronously via an IM system affects participation in a distance learning course, has been investigated in two ways. First, the BEO 03 and BEO 04 classes are compared by using two measures on participation, social network density and students' sense of participation. Then, students in BEO 04 classified as IM adopters and non-adopters are compared by data on sense of participation, and by the number of hours students engaged in interpersonal interaction and in working with content. There was no data on the number of hours students engaged in interpersonal interaction and in working with content for BEO 03 students, which could have strengthened the comparison of BEO 03 and BEO 04. Moreover, social network data for IM adopters and non-adopters was not compared since densities are calculated on the overall network. For example, IM adopters communicated with non-adopters and vice versa.

BEO 03 vs. BEO 04

When comparing the overall network density data, it is obvious that the BEO 04 network is not denser than the BEO 03 network (see Table 2). In fact, all densities when including all media, except for monthly information exchange, are lower for the BEO 04 class. The media reported to be used by the BEO 03 students were primarily e-mail and discussion board. Five students in this class voluntarily chose to use IM. As mentioned above, BEO 04 students mainly communicated via e-mail, discussion board and IM. Surprisingly, most of the BEO 04 students did not report that they communicated with others when using the discussion board even though they posted more messages per student than the BEO 03 class. In total, BEO 03 sent 219 postings (13 postings/participant) and BEO 04 250 postings (17 postings/participant). It seems that some of the BEO 03 students especially felt that they were participating in discussion with peers, while most students did not feel that they communicated with others even though it was mandatory to contribute to each discussion. Thus, some posted messages and replies but still did not feel that they were communicating with fellow students.

As has been described in the method, the questionnaires contained a measure on students' sense of participation. Initially, it consisted of six items, but the fifth item was removed to increase reliability (Cronbach's alpha = .81). The items were measured on a seven-point ordinal scale ranging from "strongly disagree" to "strongly agree" but later combined into the categories strong (6–7), intermediate (3–5) and weak (1–2) sense of participation. Drawing on the data, the percentage of items indicating strong sense of participation was 54 % for BEO 03 and 26 % for BEO 04 students (see Table 3). Even though an IM system was introduced in BEO 04, lower means indicate that these students especially seemed to feel less part of the class (item 3; M=5.6, 3.0; SD=1.3, 1.8), and neither felt that the class included social interaction (item 2; M=4.1, 2.3; SD=1.5, 1.3) nor that the class worked together (item 1; M=4.0, 3.0; SD=1.8, 1.8).

Table 3: Students' sense of participation by class

	Strong N (%)	Intermediate N (%)	Weak N (%)	Total N (%)
BEO 03	38 (54)	24 (34)	8 (11)	70 (100)
BEO 04	17 (26)	26 (40)	22 (34)	65 (100)

Pearson Chi-square (d.f. = 2) = 14.5, $p < .005$

IM adopters vs. non-adopters

The measure on students' sense of participation was also compared for IM adopters and non-adopters in BEO 04 (Cronbach's alpha = .78). Drawing on the data, the non-adopters' sense of participation was weaker (see Table 4). The IM adopters compared with the non-adopters, especially seemed to feel more like the class worked together (item 1; M=4.0, 2.1; SD=1.1, 1.9) and more comfortable when interacting with other participant(s) (item 4; M=6.2, 4.3, SD=1.0, 2.3). Moreover, it was examined whether different frequencies of IM usage may be related with high or low time spent interacting with content and interpersonal interaction. The IM adopters compared with the non-adopters, spent more hours communicating interpersonally (M=15, 6; SD=10, 4) and working with content (M=86, 60; SD=72, 31), even though this issue needs to be examined more thoroughly.

Table 4: Students' sense of participation by adopters and non-adopters

	Strong N (%)	Intermediate N (%)	Weak N (%)	Total N (%)
Adopters	9 (30)	17 (57)	4 (13)	30 (100)
Non-adopters	8 (23)	9 (26)	18 (51)	35 (100)

Pearson Chi-square (d.f. = 2) = 11.1, $p < .005$

Discussion

The overall research question of this study was to investigate whether the possibility to communicate synchronously via an IM system affected student participation in the course. In doing this, two comparisons were made. The first was between two offerings of the course where the first offering only included asynchronous media, while the second was complemented with a synchronous media, IM. The results of this comparison indicate that the degree of participation was higher in the class that did not use synchronous media. Then, however, the degree of participation by students in the second offering that adopted the IM system was compared with the degree for those that did not adopt the system. The results of this comparison indicate that the degree of participation was higher for those that adopted the IM system. Thus, the research question cannot be answered on the basis of the results.

How can it be explained that, on the one hand, a class that used an IM system operated with a lower degree of participation than a class that did not, while on the other hand, students that adopted an IM system operated with a higher degree of participation than those that did not? Of course, it is impossible to give a definite answer to this question. It is most likely that many other independent variables affect student participation. However, commonly mentioned variables such as participation by teachers (e.g. Mazzolini & Maddison, 2003), moderation techniques (e.g. Veerman, Andriessen, & Kanselaar, 2000), assessment of contributions (e.g. Macdonald, 2003) and support in technical matters (e.g. Jelfs & Colbourn, 2002) seem to be fairly constant between the two offerings. In fact, the researcher and teacher agreed to make no conscious changes in the course so that the effect of introducing IM could be monitored. One difference that most likely affected the results is that the two classes consisted of different students. In the BEO 04 class, the IM system was primarily used to support communication within project groups. In another study, the results indicated that a higher frequency of IM use in project groups was related with a higher degree of participation (Hrastinski, 2005a). However, IM use did not enhance class-wide communication and sense of participation in class. In Putnam's (2000) terms, one explanation might be that the project groups created "strong in-group loyalty", which in turn might have created "strong out-group antagonism" (p. 23).

From the results of this study, it is clear that just introducing a medium that is widely used for communication in non-educational settings does not necessarily mean it will be adopted by students. In this context, it seems that many of the participants wanted to study individually and therefore chose to communicate with other students as little as possible. Thus, they chose to be witness learners and stay in the periphery throughout the course (Bento & Schuster, 2003; Lave & Wenger, 1991). The fact that some distance students choose to study individually has been acknowledged by other researchers. For example, Garrison and Anderson (2003) write that is known that "some students actively choose distance education formats — including e-learning — that allow for study that is independent of intense contact and the temporal restraints associated with paced and interactive forms of education delivery" (p. 44). Getting students to work in groups have been a recurring problem in all deliveries of BEO (Lindh & Soames, 2004). This study indicates that this situation has not improved particularly by introducing a synchronous medium; many students still prefer to work individually. Consequently, some seem to be so determined to work individually that they do not care if the faculty encourages communication among students:

> I didn't take a distance to create relations to 20 others via the Internet. I think … that is was quite pointless to struggle to achieve some kind of solidarity and communication in the class. I think it should have been more individual. (Interview B3, IM non-adopter)

However, it seems as if the IM medium has simplified communication among those who do value a direct contact with project group members.

A surprising finding is that the respondents seldom used the IM system for social exchanges. In fact, it was primarily reported to be used to collaborate on work and exchange information. Contreras-Castillo and colleagues (2004) have also reported that an IM system was used for collaboration among course participants. However, previous research on IM in an educational setting has reported opposite results: "[IM was used] for social interaction and discussion about the school, rather than course material and group work" (Nicholson, 2002, p. 371). Together, these three studies underlie that an IM system will not, by default, be used for particular types of exchanges – this is probably dependent on many so far unknown factors. However, one consistent finding across this and several other studies is that both students (Contreras-Castillo et al., 2004; Nicholson, 2002) and employees (Cameron & Webster, 2005) find the medium useful for informal or spontaneous communication.

Conclusion

In conclusion, it should be noted that the introduction of the IM system was relatively successful — most students chose to use IM even though it was voluntarily to do so. Students primarily chose to use it to sustain weak ties and communication was most often initiated in a spontaneous way. They used IM to collaborate on work and exchange information rather than to socialize and exchange emotional support. The findings on how participation is affected are inconclusive. Consequently, there is a need for more research that tests these results in both similar and different contexts.

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