Developing professional skills and social capital through computer supported collaborative learning in university contexts

Donata Francescato*, Minou Mebane, Rita Porcelli, Carlo Attanasio, Marcella Pulino

University of Roma La Sapienza, Rome, Italy

Received 6 July 2005; received in revised form 18 September 2006; accepted 19 September 2006
Communicated by G.A. Sundstrom
Available online 31 October 2006

Abstract

This study aimed to compare the efficacy of collaborative learning in face-to-face and online university courses in developing professional skills and social capital. One hundred and sixty-six psychology majors learnt professional skills in seminars taught by the same teacher online and face-to-face. The different groups of participants achieved similar growth in level of professional knowledge, social self-efficacy, self-efficacy for problem solving and empowerment. Instead, online students were top performers on competence-based tasks. Follow-up evaluation after 9 months showed that social ties, formed initially more in the face-to-face groups, lasted more among online students. Our results indicate that Computer Assisted Collaborative Learning could provide educational opportunities to new groups of learners as well as to more traditional campus-based students.

© 2006 Elsevier Ltd. All rights reserved.

Keywords: Collaborative learning; E-learning; Distance education; CSCL; Social interaction; Small groups; Self-efficacy; Social capital; Empowerment

1. Introduction

Proponents of collaborative approaches to learning have recently gained more attention for a number of reasons. First, there has been an increase in the popularity of learning theories underlying the benefits of collaborative learning such as cultural–historical theory, constructivism and situated cognition. Vygotsky (1978) maintains that each internal cognitive change is due to the effect of a social interaction. Therefore, interaction between children and adults and between peers is crucial in promoting learning. Constructivism based on Piaget’s theories, emphasizes the importance of context during the construction of knowledge and the role of social interaction in promoting learning (Doise and Mugny, 1984). Situation-cognition theory considers learning as a process of entry in a community of practice and links together the specific context and the knowledge to be learnt (Brown et al., 1989).

Second, work in organizations is increasingly becoming centered on collaborative activities in groups (Johnson et al., 2002; Lehtinen et al., 1999; Marshall, 1995). Most educational systems, however, have in the past encouraged competition more than cooperation, individualism more then team work, self-actualization more than community spirit; and therefore often did not prepare students to work well in teams. Moreover, the distributed expertise point of view underlines that cognitive demands of modern work make the collaboration and networking of different competencies necessary for successful problem-solving (Schrage, 1990). Also Gros (2001) maintains that collaborative learning would seem more in keeping with needs of the “information society”, in which cooperative relationships, shared decisions, diversity and communication are becoming the dominant values.

Moreover several social scientists (Wilkinson, 1996; Bauman, 1998; Putnam, 2000) have documented how our western society has widely increased its financial and intellectual forms of capital, but has also seen a dangerous decrease in social capital. One can distinguish two main approaches in the study of social capital. Putnam (2000)
defines as “bridging social capital” certain characteristics of a social system such as trust, norms and networks that improve the collective efficacy of society. Supporters of this approach study, for instance, how many associations and organizations are present in a neighbourhood, which can help facilitate collective action and build trust among residents. Scientists who study “bonding social capital”, the capital which a person can accumulate through his personal networks, investigate the characteristics of interpersonal networks and how people can have access to different kinds of mutual aid, and different forms of social support through them (Coleman, 1990; Orford, 1992; Edwards et al., 2001; Francescato et al., 2004).

To enable students to do good team work, to share distributed knowledge, and to diminish individualism promoting social capital, are some of the challenges that today are facing educational institutions (Lundin and Magnusson, 2003). Looking for new pedagogical methods to reach these goals, many educators have looked with hope to what has been named the third generation of distance learning. Various called web learning, online education, or e-learning, this technique offered new opportunities for collaborative learning, compared to first and second generation distance learning based on the solo-learner model.

Until the late 1980s, in fact, most experiments in computer-supported education were based on the solo learner mode, that is they relied on the assumption that learners would learn in isolation (Bradley and Oliver, 2002). This was especially true for computer-aided instruction (CAI) programs based on the ideas of programmed instruction, but the emphasis on individualistic models was also typical of many learning environments built according to constructivist principles. The two foundations of these early developments were: a communications infrastructure used to broadcast educational materials via television, or computer, or both; and an educational design based on an analytical approach in which complex topics were broken down into simpler modules, and learning was organized as a sequence of blocks with an assessment at the end of each block (Crook, 1994).

Computer Supported Collaborative Learning (CSCL) based both on the theoretical contributions of cooperative learning models (Johnson and Johnson, 1994) and on the new technologies offered by software platforms which offer multiple communication modalities, has fostered a pedagogical shift. As the editors of the Journal of Computer Assisted Learning write: “the increased availability of computers and, as important, the advances in communication technology came together to support a pedagogic awareness of the value of learning together. The shift from computers seen as offering the potential for individualized learning through programmed instruction, to the present emphasis on learners creating their own knowledge through interaction with peers has been dramatic” (2003, p. 400).

1.1. Divergent views on the real and potential effectiveness of CSCL

Scholars disagree on the merits of CSCL compared to face-to-face traditional classrooms.

Theoretically the new CSCL pedagogical model are based on constructivist theories (Doise and Mugny, 1984) and on the ideas of Vigotsky and Piaget who maintain that pedagogical methods that foster interpersonal discourse, and social construction of knowledge are more effective than methods that rely primarily on transferring information. Through dialogue, the groups’ members understanding of a lecture or a concept is expressed and redefined through interaction with peers. For example students’ explanations of content to their peers should benefit the explainers as well as the explainees. Similarly the necessity to construct a rationale from one’s assertions during a disagreement provides another social impetus for articulating one’s knowledge. These interpretative conflicts play a prominent role in the conceptual development theories of both Vigotsky and Piaget. Moreover is though discourse that group members negotiate relationships and build trust. Discourse has both a “conceptual content” function and a “relational” function since it builds social ties as Johnson and Johnson (1994) write: “learning communities are based as much on relationships as they are on intellectual discourse. The more positive the relationships among students and the more committed students are to each other’s success, the harder the students will work and the more productive they will be” (p. 1024).

Some authors maintain that CSCL can develop participants’ feelings of social presence and social belonging, and create the opportunity to build social networks and learning communities that create social capital (Conrad, 2002; Harris, 2003; Vanderbosch and Ginzberg, 1997). Third generation platforms permit various forms of collaborative learning online, that could be used to foster affective and mutual aid ties among students. The type of communication promoted in CSCL is precisely that which favours the development of perceptions of social presence among learners. Social presence theorists think that media have the capacity to transmit all the symbolic and social information that is present in human communication (Short et al., 1976). They argue that physical co-presence is not necessary to construct psychosocial learning processes in online groups; what is necessary is communicative exchange among participants. Through exchange both bonding and bridging social capital can be built online.

Other authors (Klobas et al., 2002) maintain that CSCL can promote “metaresponses”, outcomes which are associated with a person’s ability to act effectively outside the university such as positive attitudes toward information technology, and team work, learning how to learn and that CSCL can increase empowerment, perceived academic efficacy and problem solving efficacy.
Other supporters of CSCL argue that CSCL has the potential to move not only undergraduate but even graduate training beyond the physical classroom, providing outstanding new educational opportunities. For instance, Rudestam (2004) maintains that the focus on online asynchronous learning activities found in distributed learning institutions is more compatible with a model of pedagogy that emphasizes small group discussions, collaborative problems solving, reflective inquiry, competency-based outcomes and the facilitator role of the instructor. He also suggests applying these computer-based learning tools to the training of clinical psychologists. Also Smith and Senior (2001) and Sherman (1998) advocate using more internet based courses in clinical and social psychology.

Users of CSCL are not found frequently however in the social sciences and in psychology in particular. Piotrowski and Vodanovich (2004) made a national survey of 207 chairmen of psychology department and found that only 16% used internet based instructions for General Experimental, Clinical and Industrial, and Organization psychology. The authors do not specify how many used synchronous or asynchronous collaborative learning; they only state that most restrict their, use of internet for instructional purposes (e.g. e-mail, course syllabi). It is probable therefore that most psychology professors do not understand the difference in the pedagogical models and the technological developments that characterize distant education of first and second generation (primarily based on solo learner model, and one to one computer-aided education or one to many communication through TV or internet based lectures) and CSCL (based on collaborative learning models and recently developed platforms that permit the creation of multiple teaching settings, including some that foster collaborative learning).

The confusion that underlines the term e-learning does not help to decrease the misgivings that many university professors still hold about distance education: “The rush of educational institutions to offer Internet-based courses for distance education raises some very interesting issues concerning their quality. The promise of distance education through virtual environments being able to provide high quality education has yet to be realized” (Barbera, 2004, p. 13).

Opponents argue that teaching via an online environment can compromise quality of education because teaching and learning are dynamic processes that benefit from nonverbal cues present only in face-to-face settings. Face-to-face groups are superior because physical presence allows for nonverbal communication which creates more group cohesion, and decreases misunderstandings. They also underline that present state of technology cannot effectively support audio/video transaction in real time and distance education can be therefore a threat to both educational quality. Some academics question the expense and time needed for developing an internet-based program, in face of unproven potential increment in student learning; also some think it poses a threat to professor’s intellectual property (Kiesler and Sproull, 1992; Martin, 1999; Phoha, 1999; Saunders and Weible, 1999, Warkentin et al., 1997).

1.2. How effectiveness has been typically measured and limits of previous studies

Reviewing the literature on the assessment of the efficacy of distance education, one finds quite a number of studies, which have compared the learning outcomes of various forms of distance education and traditional classroom settings. Final grades assigned to students have been primarily used (Koch and Gobbel, 1999; Phipps and Merisotis, 1999; Buerck et al., 2003; Miller 2005) to compare learning effectiveness of online vs. face-to-face courses in many academic disciplines (mostly math, statistics, science, computer science and business and less frequently humanities and social sciences). Grades have been assigned through the same assessment methodologies widely used in traditional face-to-face classes, ranging from multiple choice tests, quizzes, short essay questions, term papers and assignments and final on-campus invigilated exams (Workman, 2004; Miller, 2005; Susskind, 2005). In most studies, online university students received the same course assignment and tests as the classroom students and were graded using the same procedures. Some teachers were concerned that assessing students’ knowledge online could lead to plagiarism, however Morris and Zuluaga (2003) who randomly checked for plagiarism assignments submitted online by both on-campus and online courses, found that plagiarism in online courses was less than in on-campus course.

Using grades as an indicator of academic success are CSCL or face-to-face courses more effective? Evidence is inconclusive. Russel (1999) examined 335 studies that have reported no reliable differences in students’ academic success (final course grades) between traditional face-to-face and distance education. Phipps and Merisotis (1999) notice that a majority of studies focused on types of distance learning of first and second generation (one-way broadcast, two way interactive video) and that most have serious methodological limits, like not using randomly selected subjects, or not including a theoretical and conceptual framework. Phipps and Merisotis’s review evidences a typical flaw of in this field, they lumped together all computer-mediated learning studies (only 28% of total studies reviewed) without distinguishing whether they were based on a solo learner or collaborative learning models.

Lehtinen et al. (1999) after making a major review of all available studies on the efficacy of CSCL underline that most have not compared CSCL and face-to-face setting, controlling for relevant variables such as students characteristics, teachers, collaborative modalities employed and subject matter taught: “Although hundred of papers on CSCL have been published during the last few years, our review show that there are not too many well-controlled
experiments, which could answer the questions concerning the added value of computer and networks in comparison to collaborative learning environment without technology” (p. 2).

The most frequent flaws in studies conducted up to date include not assigning students randomly, not employing the same teacher, using very small samples, or varying in the degree of collaboration promoted face-to-face and online, not controlling for synchronous and asynchronous modes of communication, and not holding assessment procedures constant. It is important to note that there are varying definitions and degrees of collaborative learning: “On the low end of the continuum, a group might be brought together involuntarily, might have members who do not value collaboration, and might be given tasks and assessment that discourage collective behaviour. At the high end of the continuum, a group might be created voluntarily, might be trained in specific collaborative techniques or have formal roles assigned, might be asked to complete tasks that require cooperation and might have their individual assessment tied to those of their group members” (Sipusic et al., 1999, p. 3).

Even recent, and in many ways, outstanding and interesting researches still exhibit at least some of these common flaws. Sipusic et al. (1999, 2002) compared face-to-face tutored video instructions (TVI) and distributed tutored video instruction (DTVI). They held constant the collaborative learning methodology in which a small group of students studies a videotape of a lecture. They used a large sample of 700 students, taking different subjects and controlled for tutor effects, all tutors lead both a TVI section and DTVI section. They found no difference in the course grade outcome. However, they could not make a complete random assignments of students to both conditions, and in at least one course the tutor personally evaluated his students, while tutors were not supposed to grade students whose work they were facilitating.

Wang and Newlin (2000) found that students enrolled in web statistical classes earned lower grades than their counterpart in traditional classes. Since however they used individual learning modalities and assessment in the traditional classes, and encouraged group interactions only on line, but gave final exams individually for students of both settings, their results, as the authors recognize, are confounded by several possible intervening factors. Maki et al. (2000) compared learning and satisfaction in on-line versus lecture introductory psychology courses. Online students gained higher academic test scores but were less satisfied with their experience. However, there were significantly fewer psychology majors in the online group compared to the face-to-face groups and this may have had an impact on course satisfaction.

Buerck et al. (2003) found that 13 computer-science students enrolled in the online-course performed as well, using final grades as criterium, as 16 face-to-face students. Students were allowed to choose which learning setting they preferred, and the authors found a significant difference between the learning styles of students who chose online or face-to-face version. Small sample sizes in an obvious limitation of this study.

Dietz (2002) taught introductory sociology in the traditional format and enhanced by the use of electronic technologies. He found no statistically significant relationship between the use of virtual learning tools and grade outcomes. Poirier and Feldman (2004) compared the effectiveness of online and traditional courses in introductory psychology. Students were randomly assigned to a large traditional course or to an online course from a population of students who indicated that either course type was acceptable using a “waiting list” experimental design. Students in the online course performed better on exams and equally well on paper assignments compared to students in the traditional course. Online students also showed greater satisfaction with the course than those in the traditional course. In none of these studies was collaborative learning actually promoted, when it occurred it was left to student’s initiatives.

Morris and Zuluaga (2003) compared various computer programming courses which were offered on campus with traditional lectures, tutorials and laboratory classes, and online through e-mail and online chat discussions organized by students groups. They used the same assignments and final exams and found, using large samples, online students earned better grades that on campus students. However, in this study students were not assigned randomly to the two learning settings, and online students were initially less qualified. Morris and Zuluaga (2003) attribute the outstanding gains made by online students to the quality of their online delivery processes which encouraged frequent student/staff interaction. Since they did not have the same teachers deliver both on campus and online courses, however their results may be due to more dedicated, or better teachers and tutors operating on online courses.

Researches comparing the effectiveness of CSCL and collaborative face-to-face learning setting in promoting the development of professional skills, “metaresponses”, social presence, social networks and social capital are not as numerous as the one using final grades to measure knowledge acquired in specific academic subjects. In evaluation competence’s acquisition several authors suggest that ideally it should be done by measuring how the participants actually apply their learning after the training phase. They recommend that performance assessment of online training should follow identical assessment procedures already used in equivalent on campus courses or training programs (Benigno and Trentin, 2000).

Social presence has been measured by heterogeneous instruments ranging from, scales of perceived group cohesion, commitment, cooperation, and satisfaction, made ex novo or readapted from existing scales used in face-to-face groups (Francescato et al., 2006) to detailed analysis of students interactions in synchronous MOO environment (Multi user dimensions-Object Oriented)
(Harris, 2003) and in-depth interviews of adult learners engaged in an undergraduate program delivered online (Conrad, 2002).

Some qualitative studies, which do not use face-to-face comparison groups, show that CSCL promotes the acquisition of team work skills, and the creation of learning communities. MacDonald (2003) underlines that when students are required to collaborate as opposed to make optional contribution to a chat, they need and acquire additional skills such as team working and negotiating, group decision making and task management. In a qualitative case study, she compared undergraduate and graduate students, who took two different courses on IT and its applications, both on collaborative processes that took place online and on collaborative products (group projects). Students received both individual and collaborative marks. Evidence from both courses confirmed more students will participate in online collaborative activities if they are linked to assessment, and that such assignment have a positive effect in building interpersonal relations, improving confidence in inputting messages to a conference on a course topic. They had begun to make some progress in building and criticizing each other's contributions and to engage in peer review. No face-to-face collaborative control group was used. Tutors and teachers varied.

There are also several authors who report having used internet based learning successfully in teaching various professional competencies in the fields of family therapy (Maggio et al., 2001), industrial psychology (Vodanovich and Piotrowski, 1999). Some illustrate problems encountered when trying. Tolmie and Boyle (2000) illustrated the use of an online conference system to enrich the training programs of students in a Master Program of Educational Psychology. The students without a tutor actually made little use of the online, since they could achieve their shared purpose (preparing a seminar paper for a face-to-face meeting) and had lot of technical problems with the operating system online). All the above studies did not have control groups. Susskind (2005) besides grades also measured learning self-efficacy and found it increased in the technology aided class (power point) compared to the traditional class.

Some empirical evidence shows that you can develop social presence and affective ties in online contexts, but again most studies lack control groups. (Parks and Floyd, 1996; Parks and Roberts, 1998; Wellman et al., 2001; Yalon and Katz, 2001; Tu, 2002).

A few qualitative studies analyse in depth the processes that characterize on line communities and social presence with contrasting results. Conrad (2002) conducted an interpretative study with seven adults who were enrolled in asynchronous online (WebCT based) program of adult education, using interviews and field notes. She found that the experiences of building and maintaining a community were “demanding and unforgiving”, and learners “demonstrated a strong sense of compliance with tacit standards of respect and etiquette. In turn, this sense led to learners’ concerted efforts to maintain equilibrium and harmony” (Conrad, 2002, p. 9).

Harris (2003) analysed how online learners studying in a MOO synchronous environment interacted socially and formed support networks. She administered surveys and analysed student’s reflective journals and observed logged transcripts. She found the modeling of behaviour and the use of humour by three teaching staff was an important factor in the development of a relaxed and informal environment. Students, while not required to collaborate to complete assignments, supported each other with humour and encouragement. Harris concludes that this type of synchronous environment, to which students gravitated in time of stress and isolation, seems to provide a greater capacity for the development of social relationships than single course modules or CMS social spaces.

Francescato et al. (2006) in a small pilot study, compared the efficacy of collaborative learning in face-to-face and online (using Yahoo groups platform and asynchronous communication) seminars, taught by the same teacher, in which 50 psychology majors learnt the same professional skill (a community evaluation methodology). To avoid typical flaws of most previous studies, we assigned students randomly, used the same teacher, elaborated tasks which required the same degree of collaboration and held assessment procedures constant. All the measured forms of self efficacy (academic, problem solving and social) increased in both groups. Members of both groups reported similar levels of academic learning, social presence, cooperation and satisfaction with the learning experience, providing indications that even asynchronous online environment could offer the conditions for the development of positive interpersonal relationships, which are necessary to build social capital and learning communities. However our study had only a small number of students (25) in each group. The teacher who taught both groups was a strong supporter of online education and could have unwillingly “favoured” online students, since this was the very first course offered online in the psychology faculty at our university. We also did not explore if the newly created social ties among students lasted after the end of the learning experiences, therefore creating effective bonding social capital.

The present research therefore aimed to replicate our pilot study with larger groups of students, with a teacher who held neutral attitudes toward both types of learning settings, and following students for a longer period of time. We expected that face-to-face seminars would be more effective than online seminars in increasing professional knowledge and competencies and various forms of self-efficacy, since we thought that the physical presence of a teacher could represent a “modeling asset” when transferring not only knowledge but also psychological professional competencies, such as interviews skills, group processes facilitations, etc. which are also based on nonverbal behaviours (such as tone of voice, posture,
facial expressions). In addition, we aimed to verify whether social ties formed in both types of seminars lasted for a significant period of time after the end of the seminars, creating forms of bonding social capital. Again, we expected that there would more social ties formed in the face-to-face groups vs. the online groups.

2. Study 1

2.1. Method

2.1.1. Participants
A hundred and eighty clinical and community psychology majors—homogeneous for gender, age, grade average, date of university enrollment, and attending the same university (“La Sapienza” in Rome)—were randomly assigned to two seminars, online and face-to-face (FF). One hundred and sixty-six completed the seminars. Of the 14 students who dropped out mostly for reasons independent from the course (they moved, got married, found part-time jobs etc.), eight had been assigned to face-to-face and six to online groups. Of the 166 students who completed the seminars 87% were females and 13% were males, reflecting the gender composition of psychology students in Italy (about 85% female), mean age was 24, mean grade average 26 (equivalent to a B average in the USA).

2.1.2. Design and procedure
Our study was based on a between/within design with delivery method (face-to-face and on line) as a two level between factor and with measurement (pre and post) as within subject (repeated measure) factor.

The teacher, expert in both face-to-face and online teaching, built small group learning activities into a seminar series consisting of weekly modules that could be completed both face-to-face and online. The same teacher acted as content expert and process facilitator in both types of seminars. Students collaboratively studied the same subject (community psychology) and learnt the same professional skills (mostly interviewing and discussion groups skills to diagnose strong and weak points of an environmental setting such as a neighborhood or an association, or a community group) half in on line and half in face-to-face groups.

The seminar series lasted two months. Face-to-face group participants met eight times (for 3 h each week) in a university classroom, and were divided in small groups for their collaborative learning activities. The online students worked entirely online, also in small groups, apart from two face-to-face meetings: at the beginning of their online experience, when they received instructions on the function of the technologies used for online participation (mailing lists and the Yahoo groups platform) and completed survey forms for this research, and at the end, to complete post-seminar survey.

2.1.3. Materials and teaching procedures
The modules were designed with precise learning objectives and group tasks that could be completed either in a weekly three hour face-to-face meeting or online during the same week. The timing and sequence of tasks and exercises were therefore held constant for both experimental conditions. For instance if interviewing skills were taught in a certain week, face-to-face students in their three hours meeting, first discussed any problem they might have had with the reading materials on interviewing skills they had been given to them on the previous meeting. Then they decided which community expert they wanted to interview, in order to analyse strong and weak points of the local community under study; formulated key questions; and simulated an interview situation in which one of the students pretended to be, let say, the school principal and another took the role of the interviewer. After the simulated interview which was supposed to last 15–20 min both received feedback from the teacher and from fellow students. Online student’s work was organized on a weekly schedule, outlined in weekly worksheets, which were posted by teacher in the Area Messages of Yahoo groups platform. Work Sheet B illustrates how some interviewing skills were promoted on line through the same collaborative learning tasks performed with the face-to-face students.

WORK SHEET B:
“WEEKLY OBJECTIVES
1. To decide which key experts to interview and what main questions to ask.
2. To improve interviewing skills through training exercises.

ACTIVITIES PLAN
By 12 pm on May 2nd you are asked to insert in the Area Messages any question you may have about the reading materials on interviewing skills you downloaded from the area Documents last week. During this period you may consult your colleagues or email me if part of the material is not clear.

You can also start thinking about which key expert you want to interview, posting your proposals on the virtual backboard in the area Data base.

By 12 pm on May 3rd you should choose which key expert you want to interview and load on the main areas of the interview and key questions in each area.

By 12 pm on May 4th you should chose two of you that will play the role of expert and the role of interviewer and agree on a convenient time for both to start the interview.

By 12 pm on May 4th the two chosen should simulate the interview. After the interview the two protagonists should send some comments on how they felt during it and what they think were strong and weak points of their performance.

By 12 pm on May 7th all of you should read the interview done by your two colleagues and offer at least
two messages of feedback on how they performed and how the interview could be improved. By that time I will also include my feedback.

“If you have any questions or doubt, about the week’s work, feel free to ask. Have fun!!”

Students in both settings had access to the same theoretical materials on community psychology and to the same practice exercise. For this research we used most of the materials and exercises we had prepared for the pilot study (Francescato et al., 2006). Devising collaborative tasks that could increase specific professional competencies, give students opportunities to sharpen their skills in critical analysis, gain a better understanding of how knowledge is created and shared, and to give and receive feedback took quite a deal of thinking and effort, however once materials are produced and tested they are recorded permanently online and can be easily reused.

2.1.4. Measures

Students were evaluated using a variety of assessment procedures traditionally used to measure whether students enrolled in face-to-face Master in Clinical and Community Psychology have achieved a satisfactory level of knowledge and professional competence. Since we also wanted to ascertain whether collaborative learning increases students beliefs about their capacities to study, to cope with problems and to take a proactive role in social situations we also included three short scales, already tested in our pilot study (Klobas et al., 2006) and validated in previous research (Klobas et al., 2002). Finally, we added an empowerment scale to ascertain whether learning in a collaborative manner how to read the dynamics of power in a local community increases feeling of empowerment, of being able to exercise more control over one’s life as theorized by community psychologists.

The following measures were administered before and after the seminars, to all participants:

(1) To evaluate learning we constructed specific questionnaires for each seminar, some of which had been validated in a pilot research (Klobas et al., 2002; Francescato et al., 2006):

(a) The first, a Perceived Knowledge Questionnaire, asked each student how much (on a scale of 1 nothing to 7 very much) he thought he or she knew about seven specific topics about the subject in each seminar. Perceived knowledge was the sum of responses. This technique has been found to provide a reliable pre-post measure of perceived knowledge (Klobas and Renzi, 2000). Cronbach $\alpha$ for this scale was 0.74.

(b) The second, a 30-item multiple choice test (Actual Knowledge Questionnaire) measured how much students knew about the seven topics. To avoid pre-post-test memory effects, we used a split-half technique giving 15 items in the pretest and other 15 items in the post test. Each item had 4 possible answers, of which only one was correct. Maximum score was therefore 15.

(2) To evaluate competence acquisition students in small groups (4–5 students) had to produce a final paper showing they had used the appropriate techniques learnt in the seminars in am environmental context of their choice (Neighbourhood, volunteer groups, community organizations etc.). The 33 final papers were rated by two evaluators on the basis of seven criteria, found to be valid on a pilot research (Francescato et al., 2006). For each criterion evaluators could give a score from 0 (inadequate) to 5 (very good); the maximum score was 35. Interrater reliability was 85%.

(3) To evaluate the convictions that students have about their capacities to study, to regulate their motivation, to organize their studies, to find support for their learning and to find study modalities that favor learning, we adapted Pastorelli and Picconi’s (2001) Scale of Academic Self Efficacy for the university environment. The original 19 item scale, based on Bandura’s MSPSE (Bandura, 1989, 2001; Choi et al., 2001), has been used successfully in several Italian studies with school children, but only 10 of the 19 items were suitable for administration to university students. Each item was measured on a five-point scale from one (not at all capable) to five (very capable). Cronbach $\alpha$ for the reduced scale in this study was nonetheless satisfactory (.76).

(4) To evaluate the convictions that students have about their capacity to cope with problems and solve them in creative and original ways we used the 14-item Perceived Self Efficacy for Problem Solving scale (Pastorelli et al., 2001). This scale was found reliable in a large sample of Italian students. Items were measured from one (not at all capable) to seven (completely capable). Cronbach’s $\alpha$ in this study was 0.85.

(5) We also assessed the students’ convictions about their capacity to fit in, and to take a proactive role in social situations using a 15-item scale of Perceived Social Efficacy (Caprara et al., 2001) derived from the Smith and Betz (2000) scale and validated for a large sample of Italian adults. The items were measured on a five-point ordinal scale where one represented not at all capable to five completely capable. In our study, Cronbach’s $\alpha$ was 0.89.

(6) An Empowerment scale (Francescato et al., under evaluation), validated with a large sample of Italian adults, composed of three subscales: (1) Perceived capacity to define and reach objectives (10 items), (2) Perceived resilience in difficult situations and hopefulness (nine item), and (3) Socio-political Interest (five items). Items were measured on a seven-point ordinal scale where one represents minimum and seven maximum. In our study Cronbach’s $\alpha$ for the subscales were 0.86 for the first, 0.72 for the second and .86 for the third subscale.
Students took about 45 min to an hour to fill the questionnaires in small groups in supervised university settings, they gave permission to use their data for research purposes.

2.1.5. Data analysis
An analysis of variance for a mixed design was performed, having as independent factors two groups (face and face and online) and repeated measures (pre–post) for various dependent variables considered.

3. Results

3.1. Professional knowledge, competence, self-efficacy and empowerment

Pre- and post-course scores (time) and face-to-face to and online (treatment) scores were analysed through a Manova, see Table 1. Overall, professional knowledge, self-efficacy and empowerment scores were significantly higher for members of both groups at the end of the course than at the beginning, while there was no significant difference between on line and face-to-face students both in pre- and post-tests.

Anova for pre and post and online and face-to-face results for each scale are shown in Table 2.

Perceived Knowledge Questionnaire scores were similar for members of both groups, both before and after participation. The significant differences between pre- and post-course scores indicate that both modalities were effective in incrementing students’ perceptions of their knowledge of community psychology. Students’ perceptions that their knowledge had increased were consistent with increases in knowledge as measured by the Actual Knowledge Questionnaires. In both face-to-face and online seminars, students increased their actual knowledge.

Competence acquisition was measured through evaluation of the 33 final group papers (17 online and 16 face-to-face). All of the small groups did at least an adequate job, showing that these different kinds of professional competences can be learnt through both online and the face-to-face modalities. In contrast with our hypothesis, face-to-face students did not perform better. In fact ranking the 33 final papers from highest performers to lowest, showed eight on line papers in the first 10 positions, and eight face-to-face final papers among the 10 relatively worse performers. Using Mann–Whitney’s test we found a significant difference between the online and face-to-face groups ($U = 50,500 \ Z = −3099; \ p = 0.002$), online students had higher mean rank (mean rank = 2234) than face-to-face students (mean rank = 1137).

Two out of three measured forms of self-efficacy increased, for participants in both conditions. Thus, we observed statistically significant ($z = 0.05$) increases, social self-efficacy and self-efficacy for problem solving but not in perceived academic efficacy. There was a significant increase in two of the three empowerment subscales perceived capacity to pursue aims and socio-political interest, in both online and face-to-face groups, with no significant differences between the two kinds of learning settings.

4. Follow-up study

4.1. Research aims and methodology of the follow-up study

We wanted to evaluate: (1) if bonding social capital was generated in collaborative learning settings, (2) whether the eventual new social ties promoted during the collaborative learning experiences were still lasting after several months after the end of the seminars. We hypothesized that face-to-face groups would favor more social ties among their members than online groups.

One hundred and sixty-six psychology majors, who had participated in the study we previously described, were contacted by phone for a brief interview nine months after the end of the seminars. About 139 (84%) were reached: 57 out of 82 (70%) of face-to-face and 82 out of 84 (98%) online, the remaining students who could not be contacted had changed phone numbers or had moved.

Students were asked questions which tried to assess whether they had widened their social networks including new people met through the seminar. In line with the social capital literature we consider widening one’s personal network of friends an indicator of potential increased bonding social capital (Due et al., 1998; Edwards et al., 2001; Prezza and Santinello, 2002). We decided to interview students 9 months after the end of their seminars, to ascertain whether they had increased their bonding social capital that is if the friends made during the seminar had become fairly stable members of the student’s personal networks. We particularly wanted to explore if during these nine months students had given each other support in one of the four areas most mentioned in the literature on social support (instrumental, emotional, informational and affiliative). Therefore we inquired whether they had made new close friends during the seminar, if they still saw them after 9 months (affiliative and emotional support), if they heard or kept in touch by phone or email, (emotional and informational support), and if they had studied together (instrumental social support) after the end of the seminars. We also inquired about degree of satisfaction with the courses and whether they would recommend to a friend.

Table 1
MANOVA for knowledge, self-efficacy and empowerment

<table>
<thead>
<tr>
<th>Source</th>
<th>Wilk’s Lambda</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment (face to face—online)</td>
<td>0.940</td>
<td>1164</td>
<td>0.274</td>
</tr>
<tr>
<td>Time (pre–post-test)</td>
<td>0.009</td>
<td>1164</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Treatment × time</td>
<td>0.949</td>
<td>1164</td>
<td>0.404</td>
</tr>
</tbody>
</table>
5. Results

The overwhelming majority of students made at least one new close friend during the seminars collaborative learning does seem to promote the formation of new social ties and provide opportunities for building bonding social capital. However, there was a significant difference between online and face-to-face seminars (see Table 3) (79% vs. 95%), \( \chi^2 (1, \ N = 139) = 6532, \ p = 0.011 \). Collaborative learning in face-to-face contests seemed to facilitate initial friendship ties more than in online contexts as we had hypothesized, however contrary to our expectations the friendships made online proved more lasting. In fact online students (75%) maintained their friendships and still saw the friends they had met during the seminars significantly more than their face-to-face colleagues (59%) \( \chi^2 (1, \ N = 139) = 4009, \ p = 0.045 \) (see Table 3). Among the students who still were friends nine months after the seminar’s end, online students saw each other more frequently (weekly or bimonthly) than the face-to-face students (once a month).

We also asked students if they kept in touch by phone or email: 75% of online and 67% of face-to-face respondents did, with no significant differences (see Table 3).

About 9% of the face-to-face students were not satisfied with the course, since they did not like to work with other students as much as the course required; 11% of the online did not like working with the internet. The overwhelming majority of students in both conditions liked their experience and would recommend the course to a friend. None of the students, complained about having to spend too much time studying for the course, in either setting. In the personal comments students were asked to add to the group final paper, most students spontaneously remarked having learnt much on a personal and professional level. While students of both groups wrote they had learnt how
to give and receive constructive criticism, how to observe group processes, how to avoid communication errors during an interview and how to integrate different contributions and work cooperatively, only online students stated they learnt to write better, had overcome fears of computers and felt proud to have mastered a new skill like handling a learning platform. The emotional tone of the comments was positive, with the more enthusiastic remarks coming from online. For instance here how two comments on group cohesion sounded. A FTF participant writes: “In my group we communicate well, I felt accepting and accepted”. An online participant writes: “I often felt I wanted to embrace all the members of my group, and I hope we have constructed something beautiful and important among us that will outlive the seminar, I hope we will be able not to lose touch”.

6. Discussion

Lehtinen et al. (1999), after surveying the available empirical research on computer-assisted collaborative learning, remarked on the lack of well-controlled experiments concerning the added value of computers networks in comparison to collaborative learning environment without technology. Our results show that collaborative learning methodologies are effective in increasing professional knowledge and various forms of efficacy and empowerment when used both with and without technology.

We had hypothesized that face-to-face students, benefiting from the physical presence of teacher would do better in learning psychological professional skills such as interviewing and facilitating small group discussions, skills which are based also on nonverbal cues. However, our results showed that online students performed better, overcoming what could be the disadvantage of not seeing teacher’s expressions and other nonverbal behaviours.

We think part of our results may be due the fact that we used asynchronous learning, which as Rudestam (2004) and others have pointed out allows one to participate in a community of practice at one’s pace, having time to read other people comments with calm before writing, favoring critical thinking. Asynchronous learning permits to confront more viewpoints than can emerge in a traditional class discussion: time constraints of synchronous oral communication, only allow a small number of people to actually air their opinions, often they may be interrupted or confronted even before finishing to talk and people may have problems remembering accurately what was said by a colleague. Asynchronous learning may favour less conflictual communication, some evidence points in this direction. In a study examining phases of group development in face-to-face and online groups using asynchronous communication, the typical conflictual phased found in almost all face-to-face groups was not found. (Johnson et al., 2002). Further research should explore this promising path.

Did online students spend more time studying for their seminar than face-to-face students? A limit of this study is that we did not directly ask this question. Since both groups were satisfied, and no student complained in either settings we think time spent online was not a problem. Furthermore our university has standards on how many hours each student should dedicate to studying for course which gives a determined number of credits. Students are always ready to complain if the length of textbook or the time required for assignment exceeds these limits, since no official complaint was filed, we have an indirect proof that either online students did not spend more time or they thought is was worth it. The more enthusiastic personal comments of some online students, in fact stressed they enjoyed being able to post their messages at any hour and have continuous access to other students. The students in this study were randomly assigned to the two settings, but in following years, since we wanted to understand how student’s characteristics are tied to preferences for online and face-to-face, we had students choose, and they volunteered in a greater number for the online than for the face-to-face seminars. We do not think this would have happened if students had spread voices on heavier work loads for online seminars. We do think however future research should address this issue.

Another limitation of our study is that we had primarily females in our two groups. It would be important for future research to confirm these findings with more male subjects, or understand why gender differences might play in this effect. We are planning a study with only male, only female, and mixed gender composition. More studies are needed to confirm our results, however they indicate that online collaborative learning can indeed be used to

<table>
<thead>
<tr>
<th>Table 3</th>
<th>Social capital area questions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Did you develop any new close friendship among fellow members during the seminar?</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Face to face</td>
<td>54</td>
</tr>
<tr>
<td>Online</td>
<td>65</td>
</tr>
<tr>
<td>( \chi^2 (1, N = 139) = 6532, p = 0.011 )</td>
<td></td>
</tr>
<tr>
<td><strong>Do you still keep in touch by email or phone?</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Face to face</td>
<td>38</td>
</tr>
<tr>
<td>Online</td>
<td>61</td>
</tr>
<tr>
<td>( \chi^2 (1, N = 139) = 0.979, p = 0.323 )</td>
<td></td>
</tr>
<tr>
<td><strong>Do you still see each other? (nine months after end of seminar)</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Face to face</td>
<td>34</td>
</tr>
<tr>
<td>Online</td>
<td>61</td>
</tr>
<tr>
<td>( \chi^2 (1, N = 139) = 4009, p = 0.045 )</td>
<td></td>
</tr>
<tr>
<td><strong>Have your studied togegether during these months</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Face to face</td>
<td>10</td>
</tr>
<tr>
<td>Online</td>
<td>25</td>
</tr>
<tr>
<td>( \chi^2 (1, N = 139) = 2.990, p = 0.084 )</td>
<td></td>
</tr>
</tbody>
</table>
increment different kinds of professional competencies as auspicated by authors such as Rudestam (2004).

Collaborative learning did promote new friendships among students, initially more in the face-to-face settings, as we had hypothesized, indicating that social capital may be more easily built in settings that can also benefit from nonverbal communication. However the social ties built, perhaps with more difficulty online, proved more lasting, and the social support exchanged more varied. The results of our follow-up study will have to be confirmed by other research, done with different populations, however our data give some support to the thesis of those who maintain that online contexts can promote the development of affective relations and of social capital at least as well as face-to-face contexts (Parks and Floyd, 1996; Parks and Roberts, 1998; Calvani and Rotta, 2000; Biolghini, 2001; Yalon and Katz, 2001; Tu, 2002). It also supports those authors who maintain that CSCL settings can produce feelings of social presence and social belonging. (Kiley, 1993; Vanderboscob and Ginzberg, 1997).

Our data, in general, support those that maintain collaborative learning online is not a “series B” educational option (Boling and Robison, 1999; Lundin and Magnusson, 2003), but one that can also improve graduate and professional training (Johnson et al., 2002; Rudestam, 2004). The implications for educational institutions are manifold: students who cannot attend regular face-to-face seminars, or who are enrolled in different campuses, can have new opportunities online to experience collaborative learning to increase not only their professional knowledge and skills, but also their social efficacy and their social networks.

Computer Supported Collaborative Learning could also be used in settings when members of teams live in different countries, such as in international companies and worldwide nonprofit organizations. Management training programs could be set up for virtual teams using CSCL to foster the growth of social as well as professional skills in people belonging to the same organization but living in different areas or countries, in people belonging to different organizations who need to network for a particular project.

In this study, we held constant several variables associated with the success of a course (in particular, the subject matter taught, the activities and sequence of the course, the degree of collaboration required and the teacher) in order to be able to compare online and face-to-face learning in small collaborative groups. Our results support the claim of advocates of third generation distance education methodologies, who stress that the computer can be an effective enabler, not only of independent learning as in the past, but also of collaborative learning. Further research should explore how learning can be made more effective by examining, for instance, the role of teachers’ level of teaching experience online, the teachers’ attitudes toward promoting social support and sense of community among students, the effect of students’ personality characteristics and attitudes towards CSCL and type of subject matter taught. Finally, it would be particularly interesting to ascertain in which contexts and for which aims computer supported collaborative learning and solo learning produce the best results.

References


Donata Francescato has a Ph'D in clinical psychology from the University of Houston (1972). She is Professor of Community Psychology at the University La Sapienza in Rome, Italy. She is the author of 18 books translated into French, Spanish, Portuguese and Japanese. She is the national coordinator of a research project, funded by the Ministry of Research and University Education, on online Education and Empowerment. She is involved in an international research project to evaluate the effectiveness of online learning. Corresponding author address: Facoltà di Psicologia 1, Via dei Marsi 78, 00185 Roma Phone 0039-0649917554—Fax 0039-06-68806927 Email: donata.francescato@uniroma1.it

Rita Porcelli has a postgraduate qualification in online tutoring from Bocconi University, Milan and the Institute of Education, University of London. She has a PhD in Cognitive Psychology at the Faculty of Psychology, La Sapienza, University of Rome. Her dissertation focuses on comparing the efficacy of face-to-face and online teaching contexts on a series of cognitive and social variables. Postal address: Facoltà di Psicologia 1, Via dei Marsi 78, 00185 Roma, Italy.

Minou Mebane has a postgraduate qualification in online tutoring from Bocconi University, Milan and the Institute of Education, University of London. She received a PhD at the Centro Interuniversitario per lo Studio sulla Genesi e Sviluppo delle Motivazioni Prosociali e Antisociali, La Sapienza, University of Rome. She is working on evaluation of the efficacy of online affective education and on social capital in political psychology. Postal address: Facoltà di Psicologia 2, Via dei Marsi 78, 00185 Roma, Italy.

Marcella Pulino is a community psychologist and counselor and is currently doing research on social capital in online settings. Postal address: Facoltà di Psicologia 1, via dei Marsi 78, 00185, Roma, Italy.

Carlo Attanasio is a community psychologist and is currently doing research on socioaffective education online. Postal address: Facoltà di Psicologia 1, Via dei Marsi, 78, 00185, Roma, Italy.