

Learning to Collaborate, Collaboratively: An Online Community Building and Knowledge Construction Approach to Teaching Computer Supported Collaborative Work at an Australian University

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Abstract

The subject Computer Supported Collaborative Work (CSCW) immerses students into social, philosophical and psychological aspects of working online, and the technology issues associated with being an online workgroup participant. This paper describes, in the context of relevant literature, the teaching, learning and assessment strategies, as well as the open source groupware framework used to build a successful online community for collaborative learning and knowledge construction amongst students of diverse backgrounds and interests, separated by the barriers of time and distance. Student evaluation results and future plans are also discussed.

Introduction

Each of the authors has been involved in team teaching a subject called *Computer Supported Collaborative Work (CSCW)* at Charles Sturt University. The subject introduces students to contemporary social and technology issues as participants in online communities. Its enrolment comprises a wide array of undergraduate and postgraduate students, studying both on-campus and via distance education, throughout Australia and overseas, hailing from a diverse range of disciplines. It provides a focus for discussion and application of CSCW in fields such as professional development, information technology, library science, education, teacher librarianship, health care or policing. The four major outcomes of this subject are:

1. to understand the need for a multidisciplinary approach to learning and workflow within online communities;
2. to work effectively within a collaborative community;
3. to understand through negotiation the issues linked to computer supported collaborative work (CSCW); and
4. to demonstrate an understanding of the processes required to design, build, use and evaluate online communities using groupware tools.

Students explore various cognitive frameworks used in CSCW, and learn how to select and tailor a framework appropriate to specific collaborative situations and tasks. They study the principles underpinning the design and building of workgroup specific infrastructures to support successful workflow and human interaction. A mandatory component of the subject requires students to collaborate regularly with others using a variety of software – By integrating literature and other subject content about CSCW, students and instructors employ information environments and groupware tools such as e-mail, forums, Z Object Publishing Environment (Zope), Yahoo! Groups, weblogs (blogs) and MOO to facilitate collaborative learning and knowledge construction, and to capture artefacts resulting from these processes.

In addition, CSCW has a broader, underpinning aim of helping to nurture community-minded individuals, consistent with the views expressed by Peck (1987):

We human beings have often been referred to as social animals. But we are not yet community creatures. We are impelled to relate with each other for our survival. But we do not yet relate with the inclusivity, realism, self-awareness, vulnerability, commitment, openness, freedom, equality, and love of genuine community. It is clearly no longer enough to be simply social animals, babbling together at cocktail parties and brawling with each other in business and over boundaries. It is our task – our essential, central, crucial task – to transform ourselves from mere social creatures into community creatures. It is the only way that human evolution will be able to proceed. (p. 165)

Rationale

The subject was first initiated when Eustace and Hay (2000) reflected on their own discourse as University teachers and researchers, in which they and their students were expected to use a myriad of Internet services and tools to communicate and share data. They thought it timely to develop a subject to teach both *about* and *using* such

tools to help professional workgroups operate effectively online, based on a community building approach or theme.

Since its genesis, the subject has evolved at the hands of other academics at CSU, including Mark Lee and Geoff Fellows, and through the active participation and contribution of a number of student cohorts. This paper describes how the above objectives were achieved in the subject's Spring (July-November) offering in 2004, in addition to outlining plans for refinement and improvement in future iterations.

CSCL and online learning communities: A brief literature review

Collaborative learning (CL) evolved from the work of Piaget (1926) and Vygotsky (1978). It is based on the social constructivist view that learners learn best through positive, cooperative interactions with one another. There is certainly no shortage of literature supporting the benefits of collaborative learning in traditional, face-to-face settings. Closely related to this are the positive effects that the social phenomenon of community can have on learning and knowledge construction, as highlighted by the work of Dewey (1929), Vygotsky (1978), Bruner (1986, 1990, 1996), Kafai and Resnick (1996) and Cunningham (1996).

Research into *computer supported collaborative learning (CSCL)* reveals that the benefits of CL can be further enhanced through the employment of appropriate supporting technology (Kaye, 1992; Alavi, 1994; Hiltz, 1995; Veerman & Veldhuis-Diermanse, 2001). Following in this vein, modern information and communications technologies can be put to use in the development of online learning communities (Bonk & Wisner, 2000; Hiltz, 1998; Palloff & Pratt, 1999; Rovai, 2002).

However, the use of a suite of elaborate technological tools or cutting-edge delivery media will do little good to enhance teaching and learning without the presence of well-planned and effective strategies (Clark, 1983). For example, it is a well-known fact that active involvement of the learner dramatically increases the effectiveness of the learning. Strategies must be devised to ensure each learner is engaged and involved, and given the opportunity to process and apply his/her newly acquired knowledge.

It is also a widely accepted view that learners must take ownership and responsibility for their learning. As such, the role of the teacher or lecturer has shifted, in recent decades, to one of a guide, or facilitator. In fact, not only do learners, as newcomers to a community of practice, engage in "legitimate peripheral participation" (Lave & Wenger, 1991) to develop mastery of knowledge and skills through interaction with "old-timers" or experts (such as their instructors, in the case of an academic environment), they also have a responsibility – an obligation – to play a part in the continued evolution and advancement of the community's existing body of knowledge, as they move toward full participation in the socio-cultural practices of this community. The three case studies of telelearning innovation presented by Eustace et al. (2001) and the Teletop development (see Teletop B.V., 2004) by Collis (2002) are amongst the plethora of examples that stand as a testament to the merits of a learning paradigm in which instructors focus their efforts on creating a conducive online environment for students to build content and take responsibility for learning.

The authors have attempted to work towards a re-usable technology model and a set of strategies for facilitating collaborative learning and knowledge construction that takes these factors into consideration, as well as accounting for Salmon's (2004a) five stages of e-Moderating, together with Gunawardena, Lowe & Anderson's (1997) five phases of social construction of knowledge in the online environment (Fig. 1).

Groupware framework

The CSCW groupware framework is centred around five main tools, as illustrated in Fig. 2.

The CSU Forums are asynchronous, Web-based, threaded discussion boards. The system used is one that was developed in-house by the University's Division of Information Technology.

Z Object Publishing Environment (Zope) (see Zope Corporation, 2005b) is an object-oriented web application development and publishing system, written in the Python programming language (Fig. 3). It is free and open source, and available for multiple operating systems. Though functionality of the system can be dramatically extended through the use of Python scripts, a number of sophisticated server-side tasks can be accomplished with little or no programming knowledge, thanks to Zope's Document Template Markup Language (DTML). The content on a Zope server can be managed via a web browser or through WebDAV (Whitehead, 2005), the latter of which allows files to be uploaded directly from within supporting software. For example, Microsoft Office documents can be saved on Zope via WebDAV, as if it were simply another folder on the local network.

Multi-User Dungeon, Object-Oriented (MOO) was used as the vehicle for delivering synchronous online classes (Fig. 4). Specifically, the enCore system developed by Holmevik & Haynes (2004) was used. A MOO server and object-oriented core database, is a network-accessible, multi-user, programmable, interactive system originally designed for the construction of text-based adventure games, conferencing systems, and other collaborative software. Participants (usually called players) have the appearance of being situated in an artificially-

constructed place (social space) that also contains those other players who are connected at the same time. MOO facilitates polysynchronous communications, that is it allows for a hybrid communication model comprising both synchronous and asynchronous elements. For example, players can interact and chat in real-time when they are logged in to the MOO simultaneously. In addition, their actions can impact and have a lasting effect on the state of the objects in the MOO, even after they have logged out – Notes can be left on notice boards and signs erected which will allow messages to be left behind for other players; objects such as furniture and office equipment (eg. whiteboards, slide projectors) can be created, used, moved and otherwise manipulated; etc.

Yahoo! Groups (Yahoo! Inc., 2005) is a free, web-based service with which students are able to set up and manage their own discussion groups. Yahoo! Groups works on a “push” based model in which postings to the group are automatically sent to each member’s e-mail address, by default. In addition, a rich set of ancillary services are included, such as synchronous chat facilities, file and photo sharing repositories, shared databases and calendars (Fig. 5).

COREBlog (Central Core, 2004) is a Zope-based, open source web logging (blogging) system. Although originally intended to allow individuals to maintain their own personal journals and make these available for public viewing, blogs have found numerous applications in educational spheres. The easy-to-use nature and informal, journal entry style have lent themselves to ready adoption by instructors, who create blogs for purposes ranging from providing content, commentary and study hints, to disseminating subject-related announcements. Learners, too, benefit from creating their own blogs, be they for use as online learning portfolios and reflective journals, or simply as “soapboxes” for personal self-expression. Shared or group blogs also exist, which can serve as a powerful collaboration and shared publishing tool (Fig. 6).

The abovementioned tools are supplemented with regular e-mail contact between students and instructors, as well as amongst the students themselves. Furthermore, students are encouraged to investigate and explore various alternative tools to add to their groupware “toolkit”. In fact, students were required to develop their own, personal taxonomy which to classify and evaluate groupware tools as they encountered them throughout the semester.

Teaching and learning strategies

Like Waddoups and Howell (2002), the authors believe that the hybridisation of on and off-campus student cohorts is possible, and in many cases, even favourable. In CSCW, the diversity is leveraged to afford students exposure to working in multi-disciplinary teams, with members situated in physically separate locations and disparate time zones. This is, in many ways, an accurate reflection of what is required of today’s knowledge workers, who operate in what is truly a global economy dependent on the Internet. In the famous words of Gertrude Stein (1937): “...there’s no there, there.”

The teaching and learning strategies in CSCW therefore address the challenges of creating social presence, interaction and a “sense of place” (Coate, 1996) in a virtual environment, by using the groupware tools discussed earlier to provide shared and private workspaces for learners.

Subject content

In Spring 2004, the subject content consisted of five core topics:

1. Underlying principles of an online community: The CSCW framework
2. How to create online communities: Workgroups and collaborative styles
3. CSCW citizenship: Belonging to an online learning community
4. Supportive tools for CSCW
5. Case studies in CSCW

Students were provided with an online schedule of commentary, readings and exercises for each topic on the subject Zope site (*CSCW/online communities groupspace*, 2004). Exercises in the topic schedule were marked with an [OLR] tag to notify students that evidence of completion of the task was to be published on Zope in the student’s personal folder, which contributed to his/her own Online Learning Record (Fig. 7).

Meetings and workshops

Although a resource-based approach was adopted in the presentation of web-based instructional material and other CSCW content to students via Zope, weekly synchronous online meetings were held in Learning Communities MOO (*LC_MOO*, 2004), maintained by the Internet Special Projects Group at CSU. To accommodate both on and off-campus students, three one-hour MOO sessions were run each Thursday, at 11:00am, 2:00pm and 8:00pm Australian Eastern Standard Time (AEST). Students were welcome to participate in any or all of the sessions. The daytime sessions were facilitated by instructors physically present in the University’s computer labs; in the case of the evening session, both students and instructors attended MOO tutorials via university or home

Internet connections.

A seminar/workshop style was adopted for the MOO sessions in the earlier weeks of the semester. These covered general orientation to the subject and its groupware framework, in particular basic MOO training and familiarisation with Zope. Many online instructors find that interactivity is preferred over the one-way information flow of lectures. As such, in later weeks, MOO time was dedicated to open discussions and debates on topics related to the subject content, including contemporary CSCW and groupware issues.

Logs of all sessions were saved in the form of log objects in the MOO. Since the web-based representations of MOO objects are accessible via URLs (Fig. 8), hyperlinks to the logs and lesson slides (contained slide projector objects) were able to be placed on Zope for easy access.

Learning to use and program a MOO, exploration, R&D and prototype development of worlds and groupware, were also available using a second, “sandbox” MOO called K9MOO (*K9 campus and theme park, 2004*). Both MOOs were available throughout the session for students to hold their own meetings outside of regular class times. Most students were able to build their own personal and group “home” rooms, as well as populating these rooms with their own MOO objects such as log recorders, slide projectors and notice boards, to enhance the collaboration environment. Many took advantage of the programmability of the MOO by scripting their own verbs (methods, or operations) to add to the functionality and interactivity of their objects.

In addition to synchronous online sessions, face-to-face meetings were held for on-campus students. The format of these meetings was largely informal and discussion-based; they simply offered opportunities for those located at the University to convene and discuss/report on their progress in the subject. Short lectures delivered by the instructors on alternate weeks were intended to generate discussion, the notes for which were published on Zope for the benefit of all students.

Forum-facilitated discussion and additional support

The subject forum was used by the instructors to post announcements on subject-related matters, and by students to obtain general administrative and technical support. Students were also encouraged to participate in a continual class dialogue via the forums, sharing their reading, experiences, ideas and questions with their classmates. For issues of a more “personal” nature, such as matters relating to a student’s own assessment, e-mail was the preferred means of communication.

In addition to the above, e-mail was used for informal interactions between students, particularly in relation to the project work and to support the stages of group formation.

Pools of Online Dialogue (PODs)

A key component of the subject was the requirement for students to form and participate in small workgroups called *Pools of Online Dialogue* (PODs). This was to allow them to explore the dynamics of the creation and maintenance of a such a workgroup, and to be part of a supportive group structure that allowed them to explore a deeper understanding of the subject content/readings and collaborative practice in general.

Each student was allocated to a POD group consisting of four members. Differing views exist on how groups should be formed – Some contend that random assignments work best to maximise group heterogeneity (Smith, 1985; Fiechtner & Davis, 1991), while others favour a more deliberate, manual process in the interest of ensuring fairness of group composition (Walvoord, 1986; Connery, 1988). Still others prefer to allow students the flexibility of selecting their own workmates. However, in CSCW, to leverage the diverse characteristics of the individuals in the class, a deliberate attempt was made to achieve a mixture of students studying in different modes and locations in each POD group. This was driven by the desire for students to meet and work with others from backgrounds and interests that could be vastly different to their own. It also served to ensure that the collaborative work was in fact performed online. Many groups also intentionally consisted of members studying different courses (programs) in various faculties of the university, encompassing both undergraduates and postgraduates.

The POD activities began in Week 3 of the session, when students used the subject forum as an initial meeting point to exchange e-mail addresses with their group members. One POD activity was assigned for each of the five main topics in the subject. Activities were posted on Zope by the instructors each fortnight, and was to be completed before the posting of the next activity.

Although each POD group was assigned a number, students were encouraged to select a name for their POD that reflected its identity and purpose. Even-numbered PODs were required to use Yahoo! Groups to complete their POD activities, whilst the odd-numbered PODs used COREBlog. (Each POD was also assigned their own shared workspace on Zope, whose use was optional.) The purpose of this was to afford the students exposure to, as well as encouraging them to reflect on the differences between, contrasting types of tools and how they affect workgroup collaboration. To this end, the fourth activity required each POD group to send a member representative,

or “agent”, to participate in a group using the other tool. The fifth and final activity saw the agents returning to their original, “home” groups to report on their observations.

Many believe that assessment imposes barriers on effective discussion and the sharing of ideas in an online learning community (eg. Chen, 2004). As it was felt that grading the POD activities might inhibit students’ willingness to express ideas openly and freely, the decision was made not to assess these activities directly. Instead, evidence of having completed the POD activities, together with reflective comments on the experiences, were to be incorporated into each student’s individual Online Learning Record (OLR), which accounted for a substantial portion of the subject’s formal assessment.

In fact, instructors actively participated in PODs only where invited to do so by the members, as “guests”. When this was the case, the guests were to be told the purpose of their input a given a briefing of their role. They had to be made familiar with the guidelines regarding group processes, provided with technology support and supplied with feedback on their performance.

Assessment strategies

There were four assessment items for this subject. All four items were compulsory, available online and subjected to further analysis and evaluation. These are listed below in order of submission:

1. Project proposal
2. Assignment 1: Online Learning Record (OLR)
3. Assignment 2: Project report
4. Subject evaluation

The two major assignments – the OLR and project report – were formally assessed, and each carried a 50% weighting of the student’s final grade. The project proposal and subject evaluation did not carry a weighting but were required for successful completion of the subject.

Students were advised to read through all assessment instructions at the very beginning of the session as involvement in online community building exercises began in the first week of session and was ongoing throughout the semester. They were also required to work out a personal plan in preparation for the completion of weekly readings, written exercises, practical lab activities, and collection of evidence of participation in, and evaluation of, online community activities based on a supplied framework.

Online Learning Record (OLR)

The Online Learning Record (OLR), after Syverson (1995), was the vehicle used to support knowledge building and sharing of concepts, artefacts and experiences throughout the CSCW subject. Students could also use the OLR framework as a checklist to monitor their progress in completing core content. They were encouraged to document or diarise their journey throughout the semester by capturing evidence of all activities undertaken, and critically reflecting on their learning. This may have included non-mandatory activities undertaken in their own time, such as wide reading of websites and journal/magazine articles.

Each student was provided with a Zope folder or web space in which to create his/her OLR. The format of the OLR was not stipulated but was left to each student’s discretion and creativity – The process culminated in a rich collection of artefacts that may have included responses to the prescribed weekly OLR tasks, blogs containing reflective comments on the POD activities, MOO session logs, project deliverables, annotated bibliographies of CSCW resources, links to relevant websites and copies of e-mail interchanges with instructors and other students, to name but a few.

While the OLR was not formally assessed until the end of session, students were required to develop the framework of their OLR in Week 2 and record progress on a weekly basis from Week 2 through to Week 12 of the session. This required diligence on the part of students to keep their OLRs up to date and not fall behind.

Students’ OLRs were graded against a set of assessment criteria, based largely around a weighted five-point Likert scale. An excerpt from the marking sheet used is shown in Appendix A.

Project proposal and report

The project was applied in nature and required students to work alone, in pairs, or groups of three to report on, either the design and implementation of a unique online community; or to develop a case study based on the practical application of an online community model and/or groupware to enhance collaborative practice within a workplace, educational or entertainment setting. The assignment submission consisted of a project report (with supporting documentation, artefacts, additional software, etc.), and required the synthesis of ideas and issues relating to course content, as well as the analysis and evaluation existing theories, models and practices relating specifically to their chosen project.

The actual project topic was negotiated on a one-on-one basis with a supervisor. For those having trouble selecting a topic, a list of additional ideas was provided on Zope (Appendix B). The instructors and a number of other academics at the School of Information Studies, CSU agreed to act as “sponsors” for students wishing to undertake these projects.

Prior to commencing the project, students were required to complete a Project Proposal form (Appendix D), which was reviewed by the supervisor and appropriate feedback provided via e-mail. The form was scripted in DTML and deployed on Zope. In many cases this was an iterative process, with students refining and submitting several versions of the proposal until both the student/group and the supervisor were satisfied and ready to move on with the actual project execution. Continuous mentoring and feedback via e-mail continued following the approval of the proposal, throughout the duration of the project. The supervisor was also available at the end of each scheduled MOO session to offer additional assistance.

Students were asked to document the refinement process of their chosen topic and the subsequent development of their project in their OLRs, but were reminded that the OLR itself was to be assessed separately from the project. Students who worked in groups were also required to submit a Division of Work statement so that the contribution of each member could be assessed. The assessment criteria from the marking sheet appears in Appendix C.

Subject evaluation

The final assessment item was the completion of an online survey form evaluating the content, outcomes, tools and processes used in the delivery of the subject through a series of open-ended questions. Like the project proposal form, the survey form was mounted on Zope. This assessment item was also allocated a 0% weighting, but submission was required for successful completion of the subject. Two copies of student submissions were generated – one stored on the Zope server for analysis, and a second compiled and e-mailed automatically to the instructors and respondent. In addition to eliciting feedback on the tools and strategies used in the subject, the survey also served to prompt students to reflect summatively on their experiences over the semester.

Analysis of student evaluations

Methodology

A simple thematic content analysis approach was used to analyse the survey data. For each question, all responses were first read at face value to produce a preliminary (candidate) list of themes or issues. This list was gradually refined as subsequent passes were made through the data, with the content being reviewed in greater detail and common strands factored out. As part of this iterative process, categories were added, deleted, renamed, combined and divided as necessary.

Eventually, each response was categorised according to the themes/issues identified, to reveal those themes/issues that appeared to be the most pertinent, or worthy of mention. It should be noted that the categories were not mutually exclusive; some responses did not fall neatly into a single category, but rather spanned two or more categories. Conversely, other responses did not fit into any of the categories at all and were thus assigned the category “OTH” (Other).

These “distilled” themes/issues were then reported on in the sections that follow, with excerpts/quotes from the actual survey data included to provide richer insight. The spelling, grammatical and punctuation errors in these excerpts/quotes have deliberately not been rectified.

All in all, the aim of the process was to attempt to present a broad, overall or “birds’ eye view” picture of student attitudes and reactions towards the CSCW subject, as seen in the feedback submitted.

Subject strengths

Table 1 shows the categories that emerged from an analysis of the subject strengths listed by students in response to Question 1 of the survey.

Table 1. *Summary of responses to Q1: “List what you consider to be the three strengths of the subject.” (N=30)*

Cat. code	Category description	N	%
COM	Community-orientedness, collaboration and friendliness of atmosphere amongst students and between students and teachers	13	43.33
LEA	Learning knowledge and skills related to CSCW, group and groupware tools/technology	11	36.67
PRO	Project	9	30.00
DIV	Diversity of student cohort and POD workgroups	8	26.67

MOO	Online practical sessions (held in MOO)	8	26.67
GRO	Opportunity to work in groups and develop teamwork/collaboration skills	7	23.33
NOV	Novel/unique experience	6	20.00
FLE	Flexible, online nature of subject (ability to work from home, self-paced)	6	20.00
LEC	Helpfulness and enthusiasm of lecturers	6	20.00
DIS	Networking/interacting with other students from the same discipline	4	13.33
OLR	Online Learning Record (OLR)	4	13.33
POD	POD activities	4	13.33
REL	Relevance and ability to apply learning to work situation	3	10.00
TOO	Effectiveness of groupware suite/tools	3	10.00
IND	Self-directed learning / learning at an individual level	3	10.00
CHA	Challenging (eg. requiring self-motivation)	2	6.67
DED	Inclusivity for distance education students	2	6.67
EXA	No exam	2	6.67
NON	None listed	0	0.00

The “COM” category had the largest number of responses associated with it (13 out of 30 students), indicating that these students particularly enjoyed the collaborative, community-oriented nature of the subject, and the high levels of interaction with their instructors and classmates:

- “bring students together via a different medium”
- “Friendly atmosphere between the students and lecturers.”
- “Global discussions and view exchange”

It was also apparent that the subject content was well-received by the students, who highly valued learning about the theory and practice of CSCW and groups, while being exposed to some of the many groupware options available and being given the opportunity to learn how to use some of these tools. The project was the specific learning activity that received most mention, with many students appreciating the ability to contextualise their learning and apply it to their current and/or future vocations:

- “The ability to base the project work on real work activities - makes it more meaningful and relevant...”
- “Doing a project that was directly linked to something I was already involved in.”

Another one of the issues that spoke the loudest in the survey responses was the fact that students highly valued the experience of interacting with others in the diverse cohort and workgroups:

- “Not letting students choose their pod groups this was a great chance to meet students in the same situation as yourself. Especially students from abroad.”
- “Developing online communities with students from diverse backgrounds.”
- “Networking with students from different cultures and backgrounds”

At the same time, they benefited from interacting with those with similar interests, or from like disciplines.

A number of respondents commented on the novel learning experiences facilitated by the subject, in particular the confluence of the human and technological facets of CSCW and online communities:

- “introduction of unique learning opportunities/techniques”
- “A bit of mystery as to where the subject was heading and the air of experimentation”

This included the chance for them to work in teams, and to develop their “soft” skills to this end.

While students particularly enjoyed the collaborative, community-oriented nature of the subject, its flexible, online features were also applauded:

- “...the subject can be wholly completed online”
- “Learn at your own pace”
- “Flexibility with some deadlines/ongoing tasks(CSCW) so can reallocate time where needed.”

Another strength of the subject from the point of view of students was the helpfulness and enthusiasm of the instructors, which helped create a supportive, community-oriented learning environment. This was further underscored by the issue of inclusivity for distance education students.

There were also positive comments about the groupware tools used, including the level of innovation and the variety of technologies explored. MOO, especially, was perceived by many as a strength, in terms of its ability to provide an effective yet enjoyable means of facilitating synchronous collaboration and learning.

Hung & Nichani (2001) propose a constructivist framework that suggests e-learning environments should be situated in both the social community of practice and in the individual minds of learners. For example, one student listed learning how to collaborate using groupware tools and interacting with others from diverse backgrounds as major strengths of the subject, but also pointed out that he benefited from the personal reflection afforded by the OLR:

“You learn to create an online learning record, which in turn is learning at an individual level.”

Subject weaknesses

The categories of subject weaknesses identified are presented in Table 2.

Table 2. *Summary of responses to Q2: “List what you consider to be the three weaknesses of the subject.” (N=30)*

Cat. code	Category description	N	%
TEC	Technical issues/difficulties	11	36.67
POD	Difficulty in coordinating POD groups and managing group dynamics/conflict	10	33.33
ACT	Learning activities (eg. number of practical activities and case studies, volume and content of readings)	8	26.67
CLA	Clarity of assessment requirements / activity instructions	6	20.00
INT	Internal lectures (appropriateness, schedule, attendance, content, etc.)	5*	16.67
FAC	Lack of face-to-face contact	4	13.33
OTH	Other	4	13.33
TIM	Timing/scheduling issues related to online activities (eg. differences in time zones)	4	13.33
DIV	Diversity of student cohort and POD workgroups	3	10.00
MOO	MOO session organisation (chaotic, too much gossip, participants straying off topic)	3	10.00
ORG	Organisation and structure of subject content	3	10.00
WOR	Workload / time commitment required	3	10.00
FOR	Lack of formative assessment and feedback/advice on project work	2	6.67
NON	None listed	1	3.33

* 16 of the 30 respondents were enrolled in the subject in internal (on-campus) mode

The most commonly identified theme in the responses to this question pertained to technical issues/difficulties, such as login problems and issues which arose from the high level of dependence of this subject on the reliability of server and network infrastructure. The user-friendliness of one or more of the groupware tools was criticised in some instances.

The technical problems were closely followed by the difficulty in coordinating and communicating with POD group members. In many cases this seemed to be directly related to scheduling problems, possibly due to differences in time zones. A number of groups were faced with members who failed to make adequate contributions:

“...after the first week we lost two of our POD group members, so their was [there were] only two of us that completed the tasks by task 4, I think it was only me left in the group.”

“POD members who do not bother to reply or participate are a big problem.”

Although diversity was valued by some as a subject strength, others saw the mixture of students from different disciplines within a single cohort in general, and within their POD groups in particular, as a disadvantage:

“Working with other students from different content/skills(backgrounds) less motivated and less helpful.”

“...the cohort was very diverse and were starting from very different knowledge bases and interest - this had some advantages but I think more disadvantages”

It could be argued that many of these issues mirror the demands of computer-mediated communications and collaborative groupwork in the real world, which was one of the original intentions of the subject. In fact, it was hoped that students would document and reflect on these issues in their OLRs, bearing in mind they would not be directly assessed on the effectiveness or activity level of their POD groups themselves. This having been said, more support could be provided to students in the way of strategies for effective scheduling and organisation of online meetings. There may also be a need to provide more motivation and encouragement to what appears to be the minority of students, who failed to actively participate in the POD groups. Like O’Reilly and Newton (2002), the authors believe that imposing requirements through assessment is not the only way to have students perceive importance in online interaction and discussion.

A significant number of responses highlighted the fact that students sometimes found themselves unsure of what exactly was required of them in certain activities and assessment tasks, and in general. This is a reminder of the importance of clear, detailed and unambiguous instructions and guidelines, especially in an online/flexible delivery subject. For on-campus students this can be alleviated to some extent by providing additional classroom-based support, although the ideal level of face-to-face contact for students studying the CSCW subject is unclear. Some students suggested that there was a lack of face-to-face support:

“...I realise this is an online subject but often not all problems can be answered online.”

On the other hand, others felt there was little point in holding face-to-face lectures:

“Internal lectures seemed silly for a subject where practicals and content were delivered online.”

A number of students listed the workload and time commitment required, in particular the large amount of reading required, as a subject weakness. However, it should be realised that the nature of the subject is such that in order to be successful, students must work consistently throughout the semester. To use a computing analogy, students need to operate in “interactive mode” – Attempting to complete the required tasks just before the assignment due dates, in “batch mode”, is simply not feasible! One student admitted:

“...the weaknesses I found in the subject were more related to my lack of discipline than problems in the actual subject.”

Difficulties faced by students

The third question in the survey asked students to list the aspects of the subject they found most difficult. The categories that emerged from the responses appear in Table 3.

Table 3. *Summary of responses to Q3: “List what aspects of the subject you consider to be most difficult.” (N=30)*

Cat. code	Category description	N	%
POD	Coordinating POD groups	11	36.67
SCH	Adhering to the subject schedule	11	36.67
TEC	Resolving technical issues/difficulties, including learning/using one or more groupware tools	8	26.67
MOO	Participating in and adjusting to MOO sessions (chaotic, too much gossip, participants straying off topic)	5	16.67
OLR	Maintaining the OLR and completing the [OLR] exercises	5	16.67
REA	Completing the prescribed readings (due to the number, length, academic language and/or format of the readings)	5	16.67
CLA	Understanding the assessment requirements / activity instructions (due to lack of clarity, vagueness and/or missing information)	4	13.33
PRO	Completing the project	4	13.33
OTH	Other	3	10.00
DIV	Working with the diversity of the student cohort and POD workgroups	2	6.67
NON	None listed	1	3.33

Once again, the resounding issue in terms of the aspects of the subject students found most difficult, had to do with the organisation of POD groups. Students experienced difficulty including initiating and maintaining constant communications with members, scheduling meetings, encouraging participation, eliciting contributions and reaching a consensus on topics of discussion. One student attributed his/her difficulties to:

“Having to work with people that had completely different goals and responsibilities”

Another student lamented:

“... Whilst everyone completed their work, we were often a member down when it came to discussing responses.”

One student reported that his group managed to overcome the difficulty of ensuring regular contact by exercising good communication skills:

“...I also found it a bit difficult to catch up with my group members regularly due to the fact that the group has internal and external students. However, good communication skills that’s shown by every member of our group, solve that problem.”

Concerns in relation to the size of the workload were also reiterated in this section, with many students finding it difficult to work constantly to stay up to date with the schedule amidst other personal, work and study commitments:

“I found that checking the forum and my group page on a regular basis was the most difficult thing to do in this subject”

“The aspects... that I found most difficult were trying to find the time to complete every task on a weekly basis.. All I needed was a big assignment and I fell behind having to catch up all the time”

“The most difficult thing, was staying in constant communication with my POD group, while trying to study for other subjects and work.”

As mentioned earlier, discipline is required on the part of students to be consistent in completing the weekly activities. Moreover, students found it challenging to multitask or simultaneously manage the various strands of activities in the subject. Amongst the difficulties listed were:

“Juggling the streams of work - POD, OLR, Project whilst learning about MOO and ZOPE.”

“Unable to concentrate on a couple of items moving between POD activities, CSCW tasks, MOOs and project. Trying to familiarise oneself with learning new computer skills and also compete tasks that require reading...”

Although the opportunity for real-time interaction in the MOO was previously identified as one of the subject’s strengths, one student described her experience “mooing with over 20 students” as “chaotic learning”. This had a lot to do with the overwhelming attendance in the evening session, particularly in the later weeks of the semester, which a large proportion of the on-campus cohort began attending from home or the University’s on-campus residences instead of, or in addition to, the daytime sessions.

Suggested improvements

Table 4 summarises the responses to Question 4, “List what improvements could be made to the subject.”

Table 4. *Summary of responses to Q4: “List what improvements could be made to the subject.” (N=30)*

Cat. code	Category description	N	%
OTH	Other	7	23.33
MOO	MOO sessions – Make changes to the number of scheduled MOO sessions, change the topics covered in MOO sessions, better organisation and more order/control in MOO sessions	6	20.00
ORG	Improve organisation and structure of subject content and resources	6	20.00
POD	Make changes to POD group setup and administration (group size, group composition, closer monitoring/intervention by instructors)	5	16.67
TOO	Changes to the groupware framework/tools	5	16.67
NON	None listed	4	13.33
OLR	Make changes to and/or update the content and/or focus of the [OLR] exercises	3	10.00
TEC	Cater better for technical knowledge/skills gaps	3	10.00
WOR	Reduce the workload size of the subject	3	10.00
ASS	Provide more assistance and feedback with assessment work	2	6.67
CLA	Provide clearer instructions/guidelines and criteria for activities and/or assessments	2	6.67
PRA	Increase the number of hands-on practicals	2	6.67
REA	Make changes to the prescribed readings (number, length and content)	2	6.67

As can be seen from Table 4, a large number of responses to this question were unable to be classified into any of the identified categories and were therefore placed in the category labelled “OTH” (Other). However, a noteworthy number of students made suggestions related to the scheduled MOO sessions. Many students highly valued this component of the subject, but expressed the need for more order to these sessions.

In this and preceding questions, there were complaints about the time and effort required to rationalise the subject content and assessment requirements and organise them into a more manageable construction. This added an unnecessary overhead, particularly at the beginning of the semester. Many expressed a need to improve the organisation and structure of the content and resources, and take steps to ensure the consistency completeness and accuracy of information. A degree of frustration was evident in some students’ responses:

“...Pertinent pieces of information were left off so that you spent hours doing trial and error to achieve what could have been done in the first half hour if the instructions were correct...Old information on webspace that was incongruent with what we had to work with in a practical session.”

“...I think I didn’t have sufficient time at beginning of course to extensively read before realising POD groups were going to demand considerable time allocation.”

A number of students mentioned specific ways in which some of these concerns could be addressed to improve the subject. Amongst these were recreating the (Zope) webspace so that it is in line with professional learning areas, and developing a more informative and comprehensive subject outline to provide a learning “roadmap” and an overview of the various resources.

The difficulty in organising POD groups arose again, with students calling for closer monitoring of POD groups and lecturer intervention to facilitate the initial group setup. Some students also stated they would like to see more technical assistance provided, particularly for the benefit of those from a non-Information Technology background. For example, additional tuition or simpler, step-by-step instructions could have been provided for the more complex tasks, such as Zope management and MOO building/ programming. One student said he/she would like to see the use of less technical language in the documentation.

Reductions to workload and volume of prescribed readings were amongst the improvements suggested:

“OLR topic work needs to be reduced whilst the project is on – its a big work load...I am still catching up.”

“Need to rationalise course by deciding which computer skills/tools...to develop and what is to be learned.”

“...it took quite some effort and time to get through all the readings, and it got a little repetative towards the end of the subject”

Further comments

It made little sense to quantitatively analyse the responses to the final question in the survey, “Further comments to add?” due to the extremely broad scope of this question. Many responses received here suggested a sense of accomplishment and fulfilment by students in having completed the subject and achieving the intended learning outcomes:

“...it was satisfying to complete the major project and my olr. Pod and olr activities provided sound challenges”

“Overall a nicely structured subject, with good teaching strategies, By studying this subject i clearly understood the principles of CSCW, and how it can be applied in real time situations.”

“...I enjoyed completing each OLR and POD tasks. In the beginning it took some time for contacting each group members for completion of tasks, but at the end we all understood each other very well and contributed our efforts. Thus this subject indeed teaches us how to work in a group and also introduces us with new ways of communication...”

The unique learning opportunities and techniques of the subject received strong compliments again:

“I did really enjoy this subject and learnt alot. It intorduce me to a whole new learning experience through online collaboration.”

“...you don't even feel like you are completing a subject...”

“I took on this subject mainly out of interest – it sounded fascinating and it truly has been. Not only is it a new way of communicating and working, but the subject is presented like no other...I have thoroughly enjoyed my time here.”

Specifically, the more technically oriented students benefited from the socio-cultural emphasis, and the opportunity to hone their interpersonal and other non-technical skills. One student found the subject:

“...really enjoyable and completely left field from anything else I have done.”

Last but not least, the role of socialisation and friendship building in the success of the subject was given mention in a number of instances:

“This is one subject that really allows students to come out of the class rooms and complete the subject with other fellow students in a more friendly way.”

“I have learnt a lot from this subject and also made a lot of new friends which is very important. Collaboration and communication is what this subject, is all about, after all!”

Further work

The students of CSCW play an important role in the knowledge generation for the rest of the class as well as for and future cohorts. They therefore have a direct influence on the evolution of the subject and its content and are encouraged to play an active role to this end. For example, the artefacts published by them on Zope remain available to students who will study the subject in the future; the objects they have created in the MOO persist after they have completed the subject.

The authors plan to further refine the groupware framework by experimenting with and evaluating other tools and technologies. For example, a number of alternatives exist to cater for the subject's content management (*Content Management System*, 2005) needs; even Zope 3 (Zope Corporation, 2005a), is somewhat different from the version used in the subject. Plone (Plone Foundation, 2005) is a powerful, user-friendly open source Content Management System based on Zope.

The authors are also investigating the integration of *Wiki* into to further encourage collaborative knowledge generation and sharing, by allowing students to annotate and contribute to the web-based lecture materials and online subject content. Collaborative writing software may be introduced to assist groups of students working on their project reports. Finally, the authors are exploring the dissemination of text and audio content through the use of *Really Simple Syndication (RSS)*. Most blogging systems, as well as Yahoo! Groups, are capable of generating RSS feeds to syndicate XML data to subscribers. RSS 2.0 with enclosures allows for the syndication of audio content, a technology known as *podcasting*. It will hoped that the use of RSS and podcasting will make mobile learning (m-Learning) possible by catering for the delivery of instructor as well as student-generated content in the form of small, “bite sized” learning moments viewable on handheld devices such as portable music players, mobile phones and personal digital assistants (PDAs). For example, on-campus lessons and face-to-face discussions may be captured in MP3 format and podcast for the benefit of all students. Students will be given the opportunity to engage in collaborative activities using their personal mobile devices.

Furthermore, the authors will investigate the possible application of the online learning community building framework proposed by Brook and Oliver (2003) in future offerings of the subject.

Conclusion

The authors believe that the CSCW groupware framework, as well as the teaching, learning and assessment strategies, can be replicated or adapted for most computer education scenarios that will benefit from an online community building and knowledge construction approach. They may have broader implications such as contributing to best practice in this area.

Both the authors' own observations and the student feedback received supply convincing evidence that the subject and its organisation were well received by students. A detailed analysis of forum and MOO log data will be carried out in order to determine the degree to which the role of instructors as active participants played an integral part in building group harmony and confidence. In addition, the authors plan to study the importance and nature of mentoring relationships in the building of an online learning community. It is envisaged that this will entail discourse analysis of e-mail, MOO, forum and POD group data.

According to Delahoussaye (2001, cited in Differding, n.d.) online education is “an isolating and lonely

experience”. However, as one distance education student aptly observed:

“Studying via DE can either be an isolating experience or a real online community connection.”

The framework and strategies employed in CSCW go a long way towards building an inclusive learning environment that causes students – both on-campus and distance education – to collaborate and connect, and encourages them to evolve from social animals into true community creatures.

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Appendix A: Assessment criteria / marking sheet for OLR

1	2	3	4	5	6	7
Readings and exercises						
Collaborative practice						
Presentation						
Your final score out of 50 points						

Appendix B: List of “sponsored” project topics

1. Multimedia interface upgrade for LC_MOO and K9MOO
 Re-development of graphics and other multimedia elements which form the interface for LC_MOO (<http://isp.g.csu.edu.au:8800>) as well as K9MOO (<http://isp.g.csu.edu.au:9000>), including MUD maps for both environments. Sponsors are Mark Lee and Ken Eustace.
2. Q&A project
 Building a question and answer Web site for first year IT undergraduates, using a collection of newspaper articles in XML format. Sponsors are Geoff Fellows and Ken Eustace.
3. Archiving policy
 An investigation into the policy of archiving data and back-up procedures over time in an organisation eg a school, business or government department. The sponsor is Prof. Ross Harvey.
4. Wiki as a collaborative learning tool
 Wiki is a relatively new technology, used to facilitate collaborative web authoring. The most well-known Wiki implementation is Wikipedia (<http://en.wikipedia.org>). This project will involve an exploration of the use of Wiki as a collaborative learning tool in higher education. This involves some technical implementation as well as research. Sponsor is Mark Lee.
5. 3D MOO development
 Design and development of a 3D MOO using ActiveWorlds (<http://www.activeworlds.com>) to support collaborative work in a particular field such as business or education. Sponsor is Mark Lee.
6. Open source groupware tools
 An investigation of one or more open source groupware tools and/or the development of a framework using these tools, to support a particular type of workgroup or community. Sponsor is Mark Lee.

Appendix C: Assessment criteria / marking sheet for CSCW project report

1	2	3	4	5	
					Multidisciplinary approach and problem domain
					1. Purpose, plan & timeline are consistent with outcomes
					2. Use & evaluation of CSCW tools
					3. Analysis & evaluation of related theories, models & practices
					4. Evidence of application/synthesis of CSCW principles into project
					Collaborative practice and workflow
					5. Evidence of individual contribution to the report
					6. Evidence of individual contribution to community building
					7. Observed management or communication with others
					Presentation
					8. Original ideas, results/findings/recommendations & conclusions
					9. Quality of the product, study or outcomes
					10. Structure, style, content, logical flow & referencing
					Your final score out of 50 points

Appendix D: CSCW project proposal form items

1. Proposed title of project:
State a proposed title for your project, subject to change following consultation with your lecturer.
2. Group size:
How many students in your group? MAX size = 3
3. Group name:
What name would your group like to be identified as (leave blank if you will be working alone)?
4. Group members:
Provide the details of each member in your group. You are also required to nominate ONE member as the team leader, who will be responsible for liaising directly with the lecturer.
5. Groupware tool(s):
List the groupware tools you plan to use and/or explore as part of your project - e.g. MOO, Zope, COREBlog, Yahoo! Groups, BSCW, CoBrow,...
6. Ethics in my/our research:
Include a brief discussion of the ethical issues related to your research (e.g. privacy) and how you plan on addressing these issues (approx. 100 words).
7. Project description:
Include a brief description of your project including client or sponsor, collaborative needs, problems or concerns to be addressed (approx. 150 words).
8. Expected outcomes of project:
List the main outcomes or goals of your project.
9. Project plan:
List the major steps required to complete this project with resources required (include human resources here) along with a projected timeline.
10. Submitted by:
Provide the name of the member submitting this proposal on behalf of the group.

Figure 1. *Stages/phases in online community building/growth and knowledge construction. Adapted from Salmon (2004b) and Gunawardena, Lowe & Anderson (1997)*

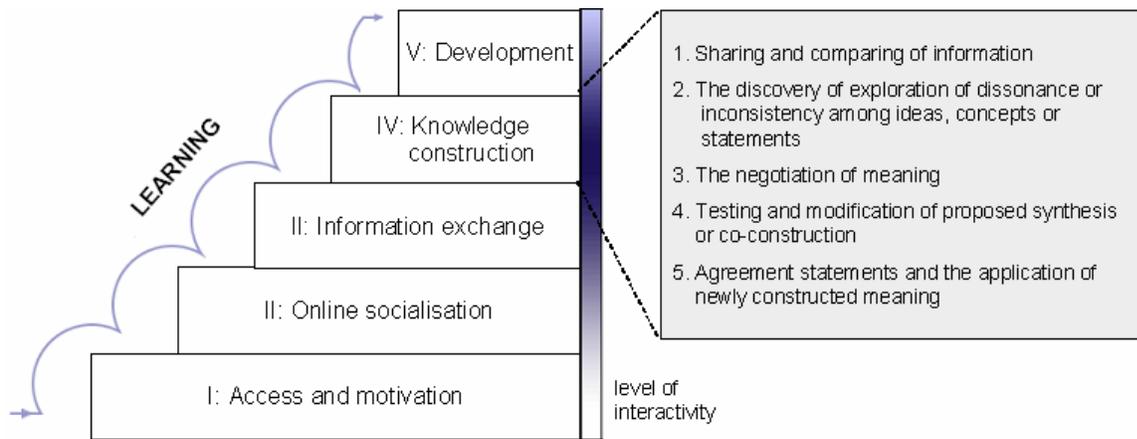


Figure 2. *CSCW groupware framework*

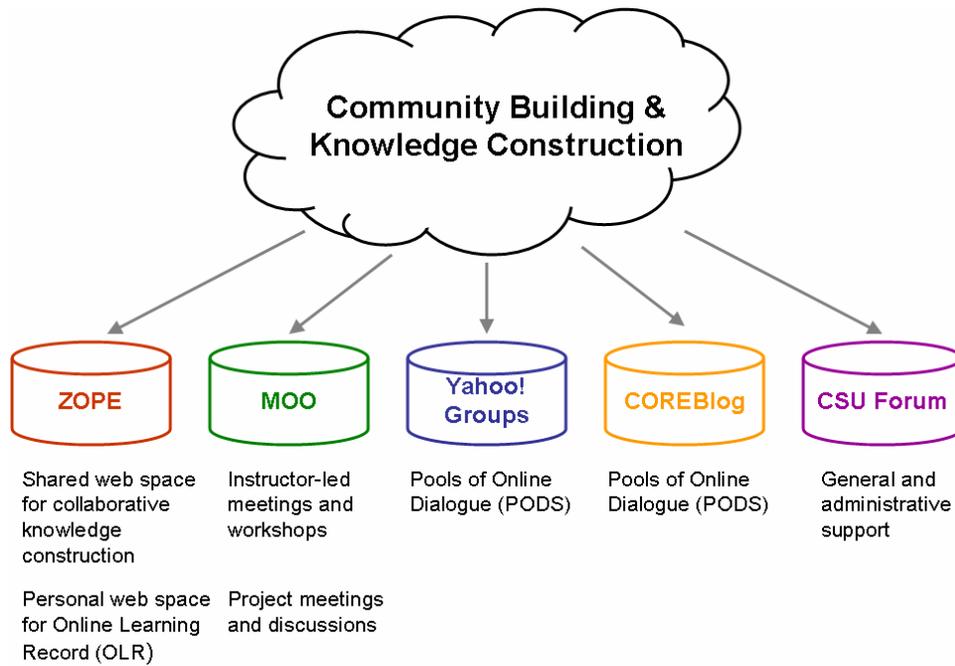


Figure 3. The top-level folder (home page) of the CSCW Zope site

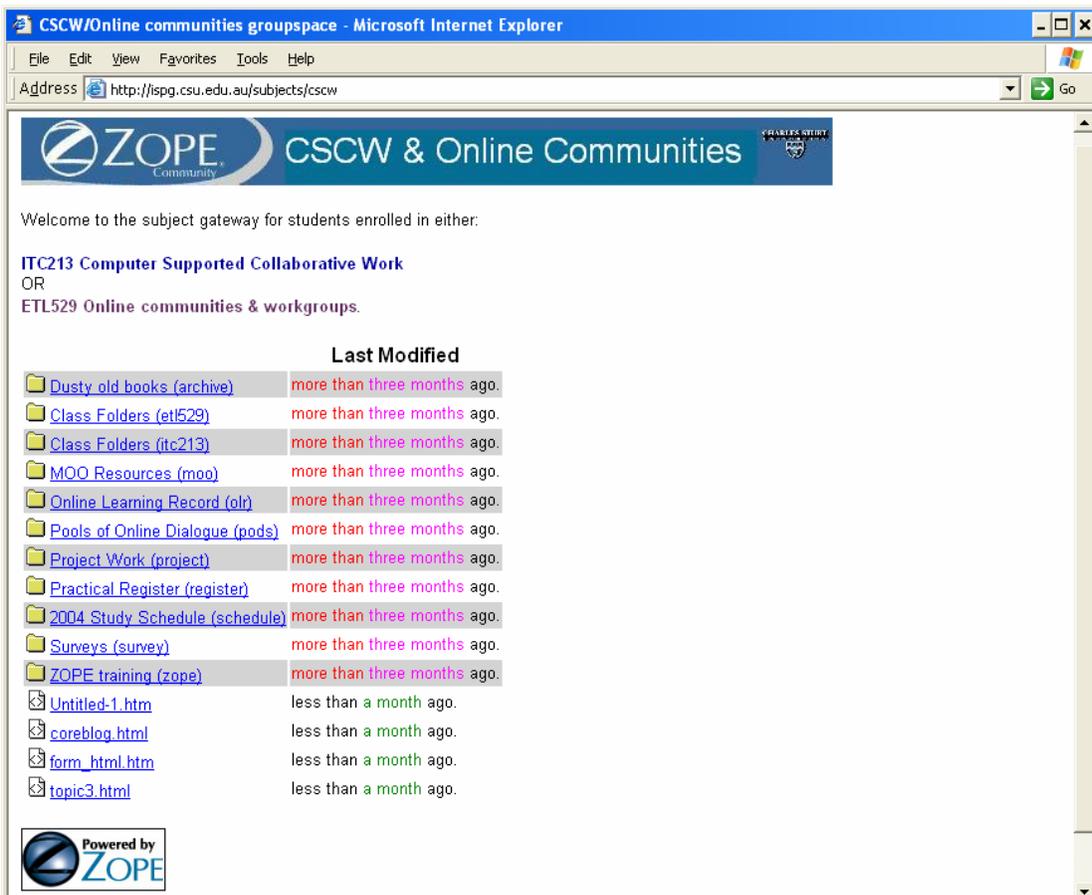


Figure 4. The Bulga Ferngully room in LC_MOO, where the CSCW meetings and workshops were held

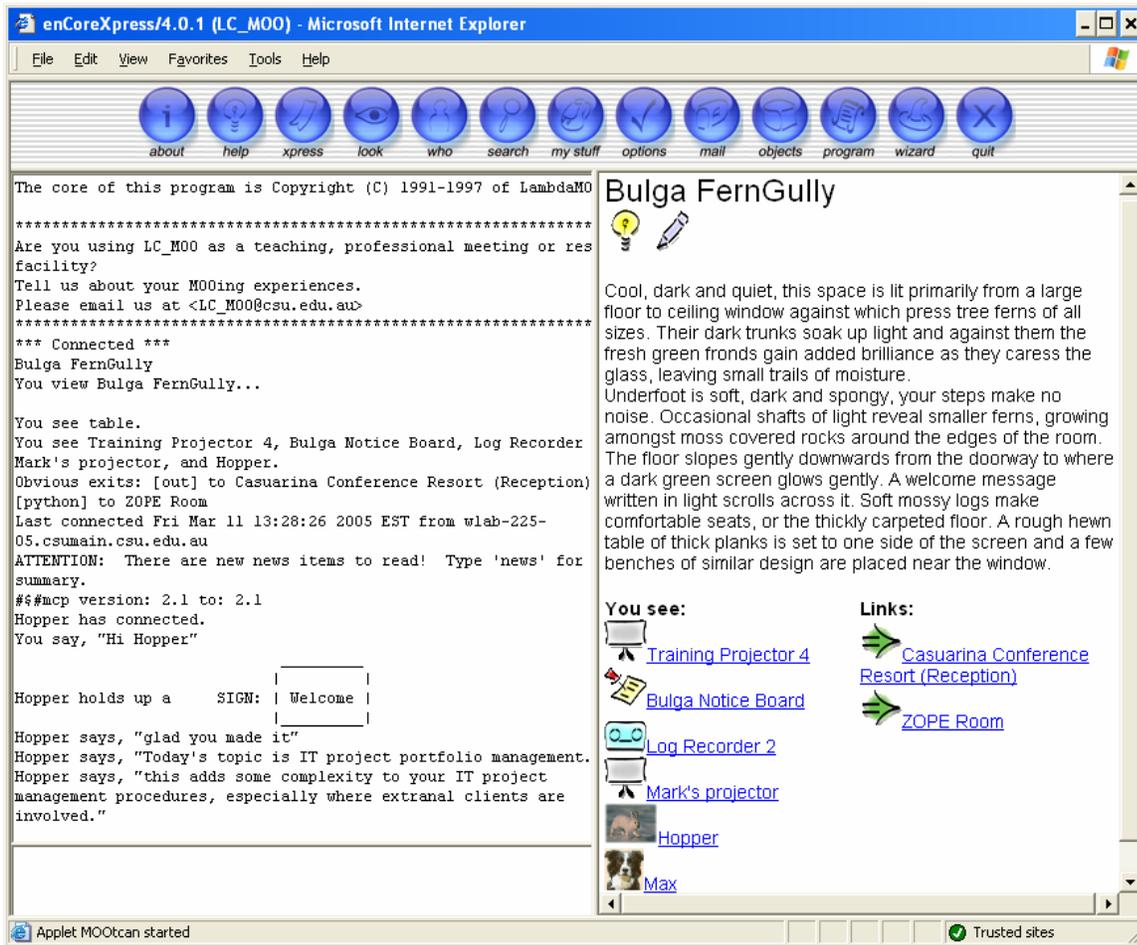


Figure 5. Yahoo! Groups

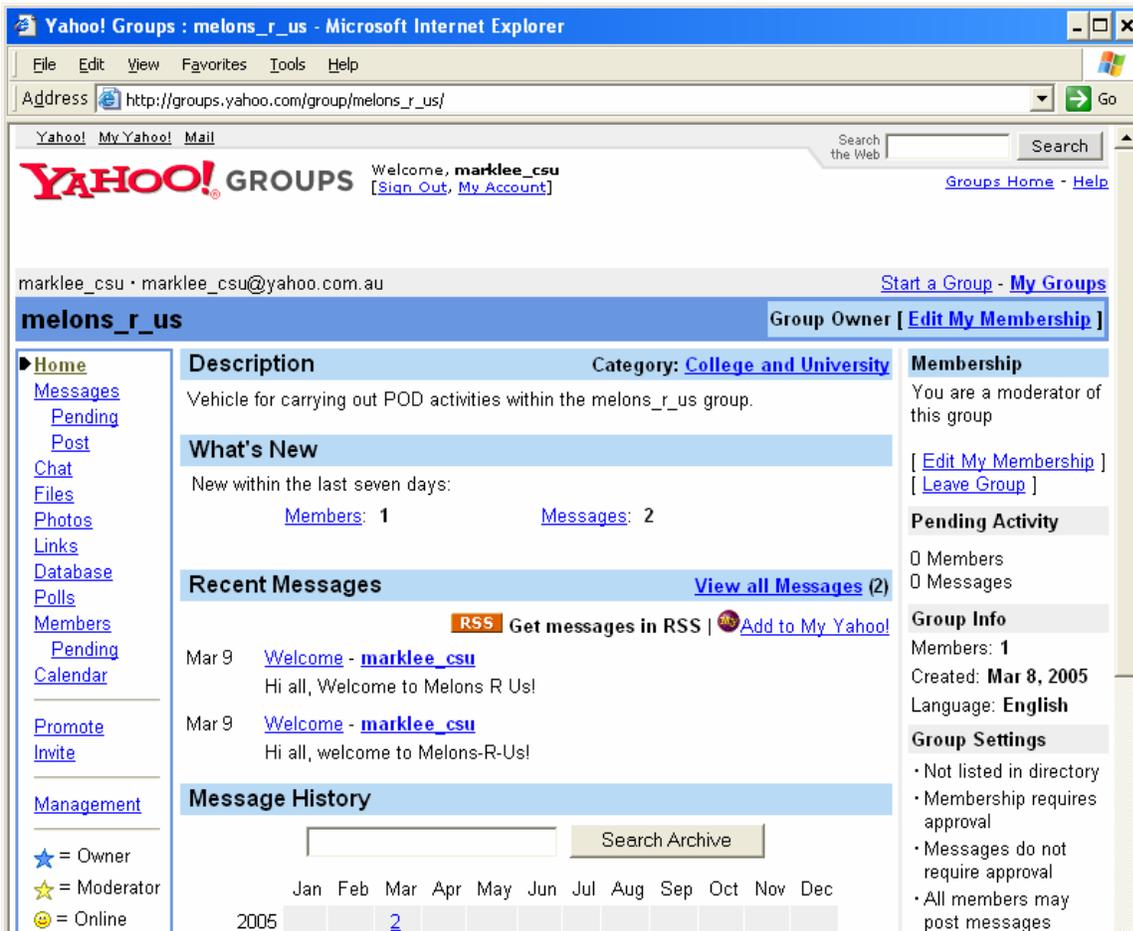


Figure 6. Group blog established using COREBlog

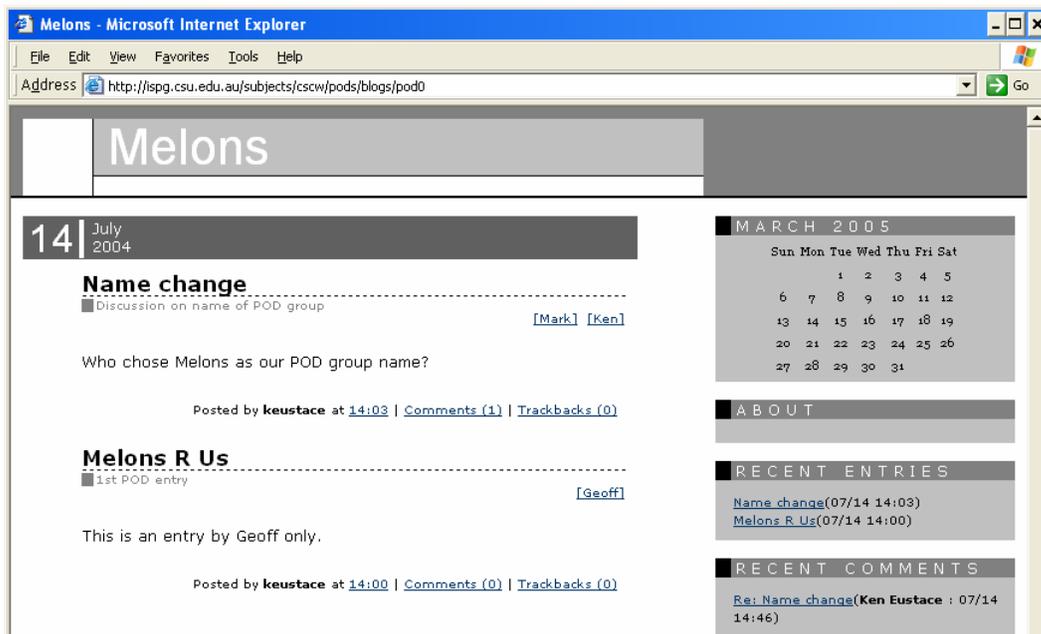


Figure 7. A typical [OLR] entry that appeared within the CSCW topic schedule on Zope

Topic 1 - Underlying principles of an online community: The CSCW framework - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://ispg.csu.edu.au/subjects/csw/schedule/topics/topic1> Go

Underlying principles of an online community: The CSCW framework

What is CSCW?

CSCW (Computer-Supported Cooperative Work) refers to the field of study which examines the design, adoption, and use of groupware. Despite the name, this field of study is not restricted to issues of cooperation or work but also examines competition, socialisation, and play aspects of groupware use. The field typically attracts those interested in software design, online communities and social and organisational behaviour, including business people, computer scientists, organisational psychologists, communications researchers, educators and anthropologists, among other specialties.

[OLR] Exercise 1: What is CSCW?

Find a reading (eg. journal article, book chapter, website) on **CSCW**. Write a short paragraph describing what you think CSCW is, based on your selected reading.

Repeat this task for the concept of **online communities**. What do you see as the connection between CSCW and the development of online communities?

Post both the reference and/or URL for both your CSCW and online communities readings, and the short paragraph on your thoughts about each, to the CSCW subforum in Week 2.

DE students will find Reading 1 by Preece in your mail package useful here. Internal students can collect a copy of this reading as a handout after the lecture in Week 1 from the front office in Building 05:

Preece, J. 2000. Research speaks to practice: Interpersonal communication. In *Online communities: designing usability, supporting sociability*. Wiley: Chichester, pp. 147-167.

Figure 8. A log recorder object (behind) player object (in front) - MOO objects can be viewed directly in a browser by specifying the relevant object number in the URL

