A Web-Based Synchronous Collaborative Review Tool: A Case Study of an On-line Graduate Course

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Abstract
On-line collaboration is an instructional method that facilitates collaboration in an on-line learning setting. To promote effective collaboration, it is vital to reveal both the student's and the instructor's point of view pertaining to effective on-line collaboration. In this study, the effectiveness of a learning management system in on-line collaboration was first investigated in a graduate course offered through the means of distance learning. In this first phase of this study, the nature of collaboration, the students perceptions of the effectiveness of the tool in on-line collaboration, the factors contributing to effective peer interaction among students and the role of the instructor as perceived by the students in the on-line course were explored. This phase of the study also involved the reviews of other learning management systems, course management systems and groupware systems regarding the tools used to encourage collaboration. Also revealed was a lack of diversity in collaboration tools. Based on these preliminary findings, an on-line document reviewing tool was developed and pilot tested in the second phase of the study. In this phase, a web-based synchronous collaborative review tool called WebSCoRe is proposed to promote online collaboration. WebSCoRe is proposed as an attempt to develop and implement a new platform for on-line document reviewing, to promote effective on-line collaboration among students and the instructor.

Keywords
Collaborative learning, Distance learning, Learning technologies, On-line review tools

Introduction

The advances in technology and changes in the organizational infrastructure put an increased emphasis on teamwork within the workforce. Employees need to be able to think creatively, solve problems, and make decisions as a team. Therefore, the development and enhancement of collaborative skills and producing graduates who are flexible and have market-related skills and abilities has been among the primary goals of higher education. On-line education provides collaboration opportunities both to the educational institution and to learners.

Several studies have shown that the implementation of collaborative learning strategies result in higher student involvement in the course and more engagement in the learning process and collaborative learning methods are more effective than traditional methods in promoting student learning and achievement (Hiltz, 1998). Gokhale (1995) stated that if the purpose of instruction is to enhance critical- thinking, problem-solving and collaborative skills, then the utilization of collaborative learning techniques will be more beneficial.

The learning management systems and groupware systems are the main platforms for distance education (Horton & Horton, 2003). It is essential to understand the factors affecting on-line collaboration in these platforms. In this study, several widely used learning management and groupware systems were first reviewed as tools provided to promote collaboration. Moreover, in order to obtain the users' point of view on on-line collaboration, an in-depth assessment study was conducted on a learning management system, called NET-Class. NET-Class has been developed at the Informatics Institute at Middle East Technical University. It has been used for delivering on-line graduate programs and some general education courses given at METU. It is also been used as a tool to support face-to-face instruction. As a tool used for promoting computer-mediated communication, the first part of the study examined the effectiveness of NET-Class on on-line collaboration for project based

learning in a graduate course offered through the means of distance learning. The student's perceptions of their experiences in on-line collaboration in the course studied were obtained. Moreover, the nature of collaboration in the course was identified from the postings in the forum with respect to the issues of interaction, participation, feedback and the utterances for on-line collaboration.

Findings indicated that NET-Class failed in providing diverse collaboration tools and platforms. Thus, a web-based synchronous collaborative review tool named WebSCoRe was developed and implemented. WebScoRe is a real-time collaborative meeting-based document review system that allows all comers to participate regardless of location. An object-oriented approach was used in the design and development of the tool and Java was chosen as the development language to ensure compatibility with the NET-Class Learning Management System.

Collaborative Learning

Learning is never a passive act. The key to the learning process is the interactions among students themselves, the interactions between the faculty and the students, and the collaboration that results from these interactions. Learning by collaborating is a social process and leads to learning being not only active, but also interactive. The requirements for education in the twenty-first century result in more emphasis on active participation rather than passive approaches presenting learning (Hiltz, 1998)

Collaboration is a synchronous activity of a gathering of parties with diverse skills and backgrounds, contributing those skills and resources in an atmosphere of trust, respect and flexibility, in order to achieve shared goals and objectives. Collaboration is something that human beings have been experiencing from early times and applying throughout their lives (Muronaga & Harada, 1999).

Collaborative learning is an instructional method that encourages students to work together in groups toward a common goal. (Bruner, 1991) The students learn or attempt to learn something together and they are responsible for one another's learning as well as their own. Thus, the success of one student helps other students to be successful.

Gokhale(1995) examined the effectiveness of individual learning versus collaborative learning in enhancing drill-and-practice skills and critical-thinking skills. Regarding gaining factual knowledge, both individual learning and collaborative learning were found to be equally effective. The study reveals that collaborative learning fosters the development of critical thinking through discussion, clarification of ideas and evaluation of others' ideas. Therefore, the study concludes that if the purpose of instruction is to enhance critical-thinking and problem-solving skills, then collaborative learning will be more beneficial.

The need for collaborative skills is commonly emphasized in information systems. Layzell, Brereton, and French (2000) argue that software engineering is no longer the preserve of individuals but is essentially a team-based activity involving a wide variety of stakeholders and thus making the need for communication and co-operation an inherent characteristic. Because of the changes in support technology, economic factors and globalization of the software process, the personnel are separated. This results in the need for effective communication and collaboration skills of globally distributed personnel. However, many of the barriers to the successful implementation of team-based collaborative software engineering practices trace directly to the poor understanding of and inadequate training for the interaction skills software professionals need to successfully enact such collaborative activities, such as requirements elicitation, project management and peer review (Schoeder and Brunner, 1996). The course assessed in this study was an information systems project course, which requires software engineering practices.

Promoting Collaborative Learning

Dillenbourg and Schneider (1995) stated some conditions for effective collaborative learning, such as group composition, task features and communication media. Group composition includes the age and levels of the participants. The size of the groups and the difference between group members are the variables affecting the group composition. Task features stress the relation between the nature of the task and the effectiveness of collaboration. There are some tasks that may not be shared, requiring individual work; some tasks are straightforward without the potential to lead to any disagreement or misunderstanding. The communication media is another essential condition for effective collaborative learning. According to the task in hand and the group members that have been selected, the collaborative process may not work, due to the inadequacy of the medium used for communication.

Dillenbourg (1999) argues that collaborative learning is not one single mechanism. If one talks about "learning from collaboration", one should also talk about "learning from being alone". Individual cognitive systems do not learn because they are individual, but because they perform some activities (reading, building, predicting), which trigger learning. Similarly, peers do not learn because they are many, but because they perform some activities, which trigger specific learning mechanisms. Additionally, the author argues that the interaction among students generates extra activities (explanation, disagreement, and mutual regulation), triggering knowledge elicitation, and internalization, and reduces cognitive load. The field of collaborative learning is precisely about these activities and mechanism. In this study, collaborative reviewing was chosen as the activity to promote collaboration.

Collaborative reviewing involves negotiation of the meaning of facts and demands for consensus for an appropriate solution. Working together on a common document allows collaborators to share and discuss their ideas about further revisions (Kim, 2002). Collaborative reviewing is one of the instructional strategies used to promote collaboration in both face-to-face and on-line settings. Collaborative reviewing provides participants to be engaged in rich interactions, which is the necessity of an effective collaborative learning (Dillenbourg, 1999).

Pratt and Pallof (2001) argue that the elements of on-line groups are the individuals, the group, the facilitator (instructor) and the technology. In collaborative learning environments, the role of the instructor and the role of the students are important.

The Role of the Instructor

Teaching at a distance involves the use of a different set of skills for instructors, compared to those used in a traditional classroom. There is a consensus in the literature that getting people to participate and making learning active at a distance is much more important than presenting the information.

According to Moore and Kearsley (1996), the most critical skills that the distance educator must develop are; making the students active participants, inducing inter-learner interaction among the participants, keeping the discussion on track and providing immediate feedback

Pallof and Pratt (1999) summarize the role of the on-line instructor in four general areas: Pedagogical, Social, Managerial and Technical. The pedagogical function involves providing guidance and a framework as a "container" for the course and allowing students to explore the course material, as well as related materials. The role of instructor becomes that of an educational facilitator. The social function of the instructor is to facilitate and make room for the personal and social aspects of on-line community. The managerial function consists of objective setting, rule making, decision making, posting a syllabus for the course, including assignments and some other initial guidelines for the group discussions. The technical function is the provision of technical facilitation by the on-line instructor, to the students. This function depends on the instructor being confident concerning the use of technology and making the students comfortable by providing guidance.

The Role of the Learner

Pallof and Pratt (1999) describe the responsibilities of the learner in distance learning environments. The authors categorized the role of learner into three areas: Knowledge Generation, Collaboration and Process Management. Knowledge Generation involves roles such as active solution seeking, viewing problem from number of perspectives and questioning the assumptions presented by the instructor and others. Collaboration consists of working together to generate deeper levels of understanding and critical evaluation of material under study, sharing resources, giving each other feedback etc. Learners have roles in process management such as being active, participating within minimal guidelines, interacting and engaging with one another and taking the responsibility for formation of on-line learning communities.

Collaborative Learning and Technology

Technology is accepted as a facilitator in applications of collaboration. The Internet is a natural enabler of collaboration in the context of on-line learning. On-line collaboration can be broadly defined as the cooperation of individuals engaged in a common task, using electronic technologies.

In the current literature, many benefits including motivating learners, increasing participation in online courses and empowering learners are directly associated with the use of effective online collaboration strategies. (Kubala, 1998; Allen, 2002). On the other hand, many researchers acknowledge that online collaboration is not an easy task but rather it remains a challenging task for all who teach online. For example Horton (2000) stressed that good design is a must for successful online collaboration, otherwise some learners may not be able to benefit fully. Especially students with high anxiety regarding communication with others may hesitate to participate in online discussions. Another challenge pertaining to online collaboration is that compared with face-to-face interaction; students may demand more interaction with the instructor. As a result, instructor should dedicate more time for discussion sessions. Finally, online communication lacks some of the features of face-to-face communication including gestures, tone of voice and body language. On the other hand, most of these drawbacks result from poorly designed or implemented applications, thus they can be overcome by proper design and use of appropriate technologies.

Most collaboration tools can be divided into three categories, being asynchronous collaboration, synchronous collaboration and integrated collaboration tools. Many businesses employ some type of asynchronous collaboration technology. These basic collaboration tools include e-mail, bulletin boards and intranets. They allow people to interact in a more friendly way, but disconnections remain. Information sharing cannot occur in real-time. Synchronous solutions represent the next level of collaboration, enabling real time communication. Virtual meetings using text chat tools, audio/video conferencing, and shared whiteboards can provide immediate connections between users. However, security can be a concern. In integrated collaboration, virtual co-location products employ leading edge collaboration technology to create permanent virtual workplaces. These environments allow people to work together in one secure place, wherever they are located, through rich communications tools like text chat, audio/video conferencing presence awareness and document sharing.

Edutech (2004) has developed an interactive platform to compare web-based learning environments according to 108 criteria. The results of Edutech (2004) study shows that WebCT, BlackBoard and LearningSpace are among the most powerful widely-used tools. In this study, these three platforms were analyzed in detail by focusing on the collaboration tools. It is found that chat, whiteboard and forum tools are commonly used for providing interaction and collaboration among the on-line participants. Apart from the learning and course management systems, the study also involves the reviews of the groupware systems. In the study, 96 groupware systems were found, the descriptions of each system were collected by means of their web sites and each was reviewed according to the tools that they provide for collaboration and communication. Table 1 summarizes the results of the analysis of groupware systems.

Apart from these, various web-based review tools were examined. wbART, a web-based asynchronous review tool, was designed to supporting technical asynchronous review (Yanbaş & Demirörs, 2003). The other review tool examined is iMarkup. This tool also facilitates asynchronous web-based collaboration on web content.

Table 1: The results of analysis of groupware systems

Tools for Collaboration	%	Tools for Collaboration	%
Forum	49	Whiteboard	16
Textual Chat	47	Workspace Awareness	16
File Sharing	30	Application Sharing	15
Audio Communication	29	Floor Sharing	12
Screen Sharing	24	Version Control	7
Integrated E-Mail	23	Collaborative Browsing	6
Instant Messages	22	Virtual Hand Raising	6
Polling	22	Voice Chat	5
Group Calendar	21	Collaborative Viewing	3
Video Communication	21	Synchronization of Content	2

Moreover, MS Word also provides some tools for collaboration and review of the documents. Although asynchronous tools have powerful features for document review, synchronous communication is more appropriate for collaborative activities, because collaboration is synchronous by nature. This study proposes a review tool which promotes collaboration by making use of synchronous communication.

An Assessment of On-line Collaboration: A case study of an on-line graduate course

To investigate the effectiveness of the learning management system in on-line collaboration, an exploratory case study was conducted based upon descriptive data. Berg (2004) describes case studies as a method which ". . . involves systematically gathering enough information about a particular person, social setting, event, or group to permit the researcher to effectively understand how the subject operates or functions." (p.251). Further, exploratory case studies can be considered as a preliminary phase of a large study. Thus, for the first phase of this study, the exploratory case study method was employed. The participants of the study included 16 students enrolled in the course offered in a graduate program at the Informatics Institute at Middle East Technical University during spring 2002, as well as the instructor and the teaching assistant. The course was offered through a learning management system, called NET-Class as a case that grounds the whole research process.

All the activities involving collaborative tasks in the course were analyzed. Accordingly, the collaborative groups and peers were determined. The collaborative groups were whole class, the discussion groups formed in the forum environment and peers working together to develop the project required in the course.

A combination of quantitative and qualitative research methods were employed in the study: a questionnaire survey, observation, interviews and document analysis. The qualitative analysis method was applied to the transcripts of the interviews, the outcomes of the observation reports and the outcomes of the document analysis of messages posted on the forum. The coding schema developed by Curtis and Lawson (2001), was used to describe the utterances in on-line collaboration in discussion forums. The coding scheme consists of 15 behaviors and 5 behavior categories as shown in Table 2. The messages posted in the discussion groups were also analyzed according to 3 important issues, participation, interaction types and feedback.

Table 2: Coding Scheme

Behavior categories	Behaviors
Planning	Group skills
	Organizing work
	Initiating activities
Contributing	Providing help
	Giving feedback.
	Exchanging resources and information
	Sharing knowledge
	Challenging others
	Explaining or elaborating
Seeking Input	Seeking help
	Seeking feedback
	Advocating effort
Reflection / Monitoring	Monitoring group effort
	Reflecting on medium
Social Interaction	Social interaction

Findings

Although the study is based on a one-semester observation rather than longitudinal observation, it contributes to understanding of the effectiveness of NET-Class on-line collaboration, the factors of effective on-line collaboration and the role of the instructor in an on-line collaborative learning environment.

The findings provide information concerning collaboration in class, the factors affecting on-line collaboration, the instructor's role in on-line collaborative learning environments and the suggested collaborative learning environment.

Collaboration in Class

The findings indicate that except from the initial phase in which learners start to get to know each other, some peers worked individually throughout most of the phases. They preferred to divide each task into sub-tasks and distribute the sub tasks among themselves. Their work is more cooperative than collaborative work. These peers

stressed that the time, work overload and knowledge levels drove them to work individually in most of the phases.

The findings regarding both discussion groups and whole class were similar. The on-line interactions in both collaborative groups show that the interactions provide contributions to the participants. According to evidence for collaboration in on-line interactions to the findings, it is found that the *Contributing* behavior category has the highest proportion among the other behaviors for the whole class. *Sharing Knowledge*, and *Exchanging resources and information* are prominent behaviors of this category respectively. On the other hand, the *Social Interaction* behavior category was not present in the coded behaviors in either of the collaborative groups. This means that the discussions were task focused.

According to the quantitative results, it is found that the average feedback provision time was about 2 days and 3 hours. Regarding the type of interactions, 34 % of the messages involved student-student interactions and participation of the students was about 40 % for the whole class. Moreover, disorganized messages and threads in the forum, lack of student-student interaction, the language of the discussions, lack of participation and activities in discussions in the forum were the major problems expressed by the participants of the study.

The Factors Affecting On-line Collaboration

According to the findings of the study, the factors affecting collaboration in on-line courses are given in Figure 1. Apart from these factors, the participants proclaimed that some strategies used in on-line discussions such as discussion circles were effective, as student-student interaction had the highest value. According to student feedback, it was also found that the provision of a platform in which all students or the group members could meet at a particular time and discuss the projects each week may be an effective strategy to promote effective peer interaction. The discussion is synchronous in nature; however, the forum tool will be used instead of chat tool as in the traditional synchronous communication. This is something similar to 8:30 classes in the traditional learning settings.
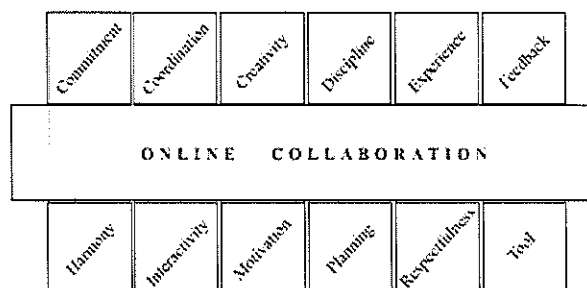

Figure 1: The factors affecting on-line collaboration

Role of the Instructor

It was found that the objectives of the course, the content of the course and the nature and purpose of the task were the factors affecting the role of the on-line instructor. Moreover, almost all of the students emphasized giving immediate feedback, keeping discussions active, monitoring group work and motivating learners as the major roles of the on-line instructor in on-line collaborative learning environments.

Suggested Collaborative Learning Environment

The participants were asked to describe the desired tool with which they thought on-line collaboration could be conducted successfully. Responses indicated that participants consider the forum, instant messaging, common library and review tools as essential to successful online collaboration. Participants also valued inter-group interactions as much as intra-group interactions. Figure 2 depicts the structure and components of an online collaboration session proposed by the students.
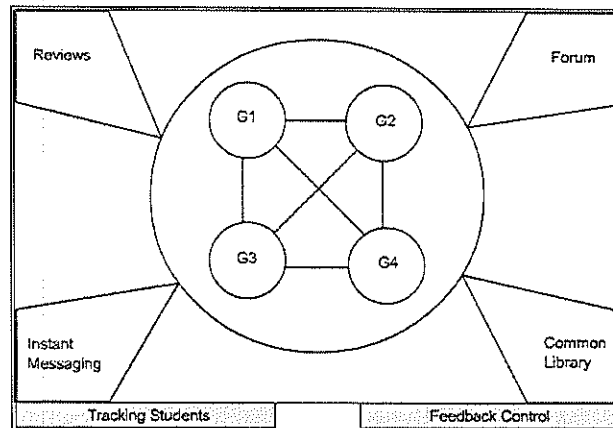
Figure 2: The structure of on-line class with collaborative groups

WebSCoRe: Web-based Synchronous Collaborative Review Tool

According to the results, it was found that in the majority of groupware systems, collaboration is provided with some particular tools such as chat, whiteboard, file sharing, audio communication, discussion board, e-mail etc. These tools are important and essential parts of an on-line learning environment. However, it is essential to enrich the learning environment with variety of tools, which support different instructional strategies such as reviews.

Because of the lack of diversity of tools, the contribution of collaborative reviewing strategy to gain collaborative skills and the suggestions of the participants of the study, a synchronous web-based tool called WebSCoRe, used for promoting on-line collaborative reviewing, is proposed in this study. WebSCoRe supports distributed and synchronous collaborative document reviewing in on-line learning settings. It is a real-time system that lets everyone participate regardless of location.

The users of WebSCoRe are categorized into two groups: Students and Facilitators. A Student can be either the author, who is the creator of the document or a reviewer who gives comments about the document. The facilitator is the manager of the review session, and s/he initiates the review. The facilitator also has the same roles given to the reviewers.

The document constitutes the core of the review session. We assume that authors have created the document and sent it to the instructor; therefore reviewers have already read the document and have prepared for commenting. WebSCoRe provides a meeting-based communication platform between reviewers and authors in order to share ideas and comments after the examination of the document created by the authors with an eye to criticism and correction. Discussion is the backbone of the WebSCoRe which promotes collaboration through rich interactions among on-line participants.

The facilitator is responsible for facilitating the review session. Figure 3 displays a typical view from the review room screen. This is the main meeting space for on-line review. The facilitator, reviewers and authors examine the document and discuss about the comments in turn through this screen. The review room screen involves three parts. In the first part, reviewers and authors are listed and the content of the document is displayed. The content area is the place where the reviewers and the facilitator select the text from the content and give comments to the selected area. The second part is called the comment area. The comments given by either the facilitator or a reviewer are displayed in this area. Lastly, the third part is the discussion area where all participants of the review session may send messages to each other. The structure of the review room screen is almost the same for each user. However, according to the roles of the users, some of the functions may be disabled in the review room screen. For example, authors are not allowed to give comments about their own document. They may discuss comments given by the reviewers and the facilitator. Therefore, "Add Comment" and "Accept" and "Reject" functions are not displayed in their review room screens.
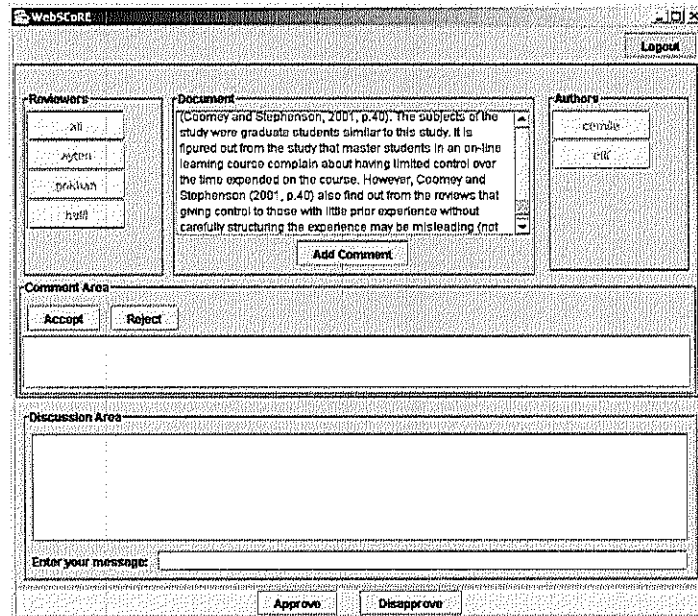
Figure 3: Review room screen

Color is one of the most important features of the WebSCoRe. Color is used very simply to differentiate the users from each other. Each user chooses his/her color that will represent the user. It is assumed that this prevents confusion when the number of participants is high.

Figure 4 displays an exemplary review session with four users (screenshots 1, 2, 3, and 4): the facilitator, two reviewers (Reviewer A and Reviewer B) and the author. The color of each user is reflected in the review room screens. The selected text area, the name of the users and the messages sent by the users are colored with a differently for each user (screenshot 1). In the example given below, Reviewer A selected the text from the content and gave the comment about the selected content. The color of the selected area is the same color with the color of Reviewer A, who sent the comment (screenshot 2).

The other important feature of the WebSCoRe is that each comment is examined and discussed in turn. Therefore, when any of the reviewers or the facilitator provides comments, the functions for providing comments become disabled in the review room screens of the other users who are not providing comments. For example, in the example below, "Add Comment", "Accept" and "Reject" buttons in the review room screens of other users become disabled when the Reviewer A sends his/her comment (screenshot 3). After discussing the comment, a common decision should be taken to accept or reject the comment. Then, Reviewer A finalizes the examination of his/her comment by either accepting or rejecting the comment.

The review session is finalized by the facilitator (screenshot 4). It is assumed that the participants will come to a decision to approve or disapprove the document. The facilitator is responsible for approving or disapproving the document according to the decision taken by the review session members. It becomes clear that WebSCoRe focuses mainly the discussions among the participants.

Utilization of WebSCoRe

WebSCoRe was applied to review user manuals of a learning management system by the developers of the user manuals. Although the application is an initial experiment of the tool rather than a case study to validate the effectiveness, it contributes to understanding of effectiveness of WebSCoRe in on-line collaboration, and the strengths and weaknesses of the tool.
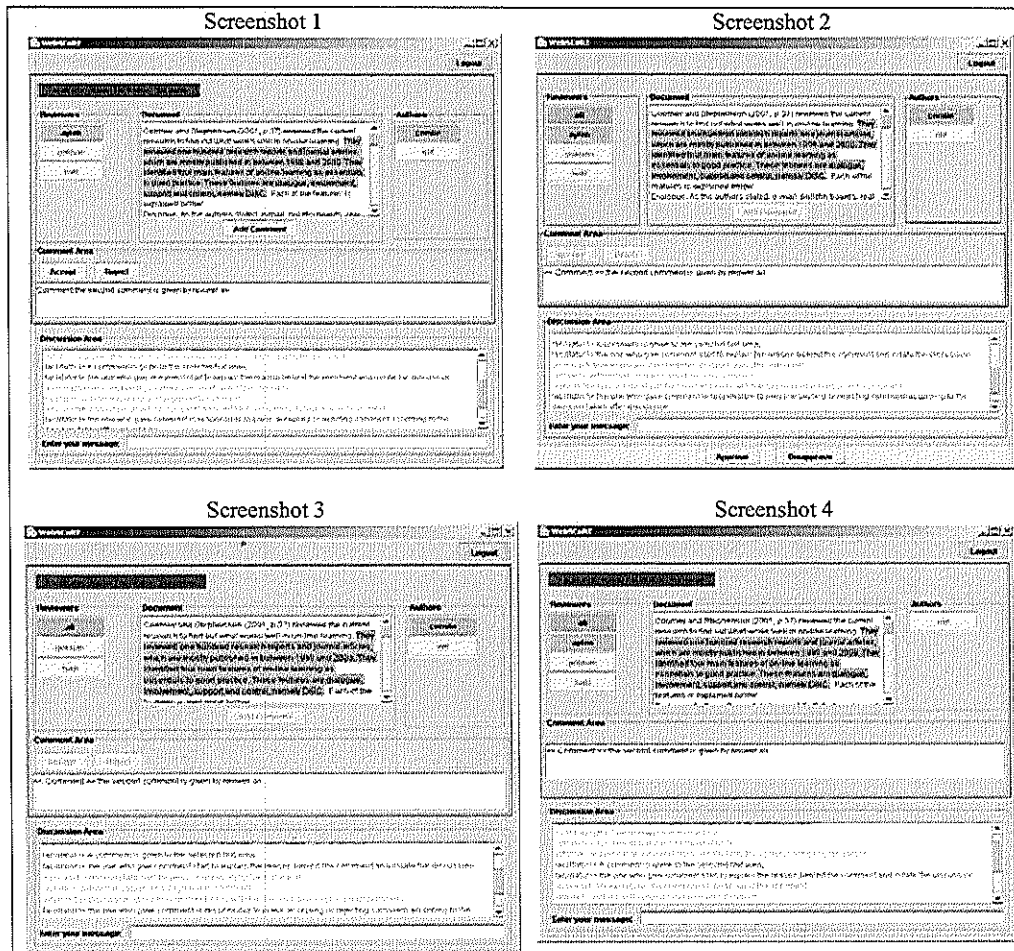
Figure 4: View from a review session with four users

The participants of the application were the research assistants and graduate students. They were responsible for creating and reviewing the user manuals developed for a learning management system. All participants have the knowledge and experience regarding document reviewing. We constructed each review with at least three users: a facilitator, a reviewer and the author. At the end of the application of WebSCoRe, we had six review sessions. We then interviewed the participants and asked about the effectiveness, strengths and weaknesses of WebSCoRe. The semi-structured interview approach was used. The average time for the interviews was 40 minutes. We analyzed the interviews using qualitative analysis procedures.

According to the findings of the analysis of the responses, we found that all of the participants believed that the WebSCoRe could promote both effective on-line collaborative learning and collaborative working. The participants generally compared document reviews in on-line settings with document reviews in face-to-face settings. Few of them believe that document reviews in on-line environment could not be effective as in the face-to-face settings. They argued that in on-line settings, it is necessary to keep sentences as simple and small as possible. However, in face-to-face environments, they argued, even mimics can explain lots of things, which cannot be expressed in another way. On the other hand, all of the participants argued that the distance education and on-line learning settings have become necessary in this era, and therefore, there is a need for variety of tool that might increase the quality of the instruction given through the Internet. They believed that the WebSCoRe could be an example of this kind of tool. In fact, one of the participants said, "… the WebSCoRe was developed for conducting documents reviews in on-line settings and it has the closest design to the document reviews in the face-to-face settings…"

The findings also revealed the strengths and weaknesses of WebSCoRe (see Table 3).

Table 3: The Strengths and Weaknesses of WebSCoRe

Strengths	Weaknesses
• Immediate feedback • Discussion-oriented • Color coding • Providing ease of tracking comments and discussions • Providing high participation • Increasing motivation • Better than e-mail or forum tools	• Tracking is difficult when the group size is high • Communication is slow • There is a need for writing short sentences • The details cannot be considered at all • The effectiveness is highly dependent on of the facilitator

The findings indicate that determining the review strategy, providing guidelines for review process, engaging the group in discussion of guidelines, formulating shared understanding, getting people to participate to the discussions, and providing support as needed are found as the major roles of the on-line facilitator in synchronous document review environment.

The findings also provide some recommendations for the further improvement of the WebSCoRe such as giving more control to the participants, increasing the use of keyboard and extending the features of the tool by adding sound facilities. The findings state that like color, sound might also help to track the review session.

Conclusion

"Collaborative learning", "team work", "student-centered learning" and "students taking responsibility for their own learning" have become essentials in education in the information age. There is a high demand from staff and employers for students to graduate with good interpersonal skills, knowledge of group dynamics, the flexibility to work in teams, the ability to lean, to solve problems and to communicate effectively.

This study indicates that collaboration in on-line learning environments depends on both instructional and technical issues. Although technical aspects are important, the spirit of distance education lies in the instructional strategies applied in the learning settings. Therefore, it is suggested to design and develop new instructional strategies and methods and then to design and develop necessary tools accordingly. Conducting reviews on a document is one of those effective instructional strategies and WebSCoRe, the collaborative review tool proposed, was found to be effective in facilitating on-line document reviews. According to Dillenbourg (2000), interaction can be rich when the participants explain themselves in terms of conceptions and not simply answer, when they argue about the meaning of terms and representations and shift roles. It is found that WebSCoRe encourages participants to build such rich interactions through providing a platform for working together on a common document, which provides for the collaborators to share and discuss their ideas about further revisions.

Coomey and Stephenson (2001) argue that getting immediate feedback is one of the essentials of an effective on-line learning environment. Moore and Kearsley (1996) also add two more issues as the essentials such as increasing motivation and participation. The study also confirms that the giving immediate feedback, increasing participation, encouraging student-student interaction and social interaction are the three essential tasks of an effective on-line collaborative learning environment. According to the findings, it can be concluded that WebSCoRe satisfies these essentials of on-line learning environment.

The study showed that pedagogical and the managerial functions of the facilitator to be more important and highly emphasized in on-line document reviews. The group size, the quality of facilitation, the speed, and the lack of facial facilities such as mimics, the limited size of discussions were stressed as the important issues affecting the effectiveness of WebSCoRe and given as the weaknesses of the tool. In fact, these issues are the weaknesses of the distance education environment rather than the weaknesses of WebSCoRe.

To summarize, collaborative review is one of the instructional methods that promotes rich interactions. It is effective to apply collaborative reviewing strategy to develop collaborative skills and to promote collaborative learning. According to the findings of the study, it can be concluded that the WebSCoRe is a promising tool that might be a positive influence in developing collaborative skills and supporting effective collaborative learning.

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