Information Technology and Constructivism in Higher Education: Progressive Learning Frameworks

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Chapter XV

Constructivism and Online Collaborative Group Learning in Higher Education:
A Case Study

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ABSTRACT

As educators utilize an increasingly wide range of technologies for facilitating interaction between distant learning parties, there are concerns over the ad hoc use of technology in online course design and activities that are not grounded in sound pedagogical frameworks. This chapter presents a case of a hybrid undergraduate course that is shaped by sociocultural constructivist principles. Survey findings on student experiences of online collaborative learning and group work processes in two constructivist-based learning activities are reported. Results reflecting sociocultural constructivist concepts of scaffolding and appropriation of shared knowledge are presented based on student learning experiences during online synchronous tutorials and collaborative team projects. The conclusion discusses the effectiveness of the two course activities in facilitating collaborative group learning and recommendations are offered to enhance overall student experiences of online collaborative-constructivist group learning processes.
INTRODUCTION

As educators access an increasingly wide range of technological tools for facilitating interaction between distant learning parties, there are concerns over the ad hoc applications of technology in online course design and activities that are not grounded in sound theoretical frameworks. This chapter reviews the philosophical assumptions of constructivism that influence interpretations of the form and function of educational interaction with specific focus on the branch of sociocultural constructivism. A qualitative case of a distance undergraduate course that is shaped by sociocultural constructivism is presented. The chapter also explains the influence of constructivist concepts on the instructional aims, virtual learning environment (VLE) design, the conduct and assessment of two main learning activities facilitated by computer-mediated communication (CMC) technologies, namely, online synchronous (chat) tutorial discussions and a collaborative team project.

Survey findings on student experiences of online collaborative learning and group work processes in the two learning activities are reported. Results reflecting sociocultural constructivist concepts of scaffolding and appropriation of shared knowledge are presented from student learning experiences during online synchronous tutorial discussions (Lim, 2006), and collaborative team projects (Sudweeks, 2003). The conclusion discusses the effectiveness of the two constructivist-based course activities in facilitating collaborative learning. Finally, several recommendations are offered to enhance the overall student experiences of online collaborative-constructivist group learning processes which may be of interest to researchers in the fields of CMC and educational technology, higher education faculty and other professionals involved in distance learning.

BACKGROUND

Although interaction is widely assumed to support learning, distance education literature offers various interpretations of its form and purpose, which are likely to stem from different theoretical beliefs of what constitutes knowledge and learning. This section reviews the philosophical basis of constructivism and discusses the sociocultural constructivist conceptualization of educational interactions in online learning and teaching contexts.

OBJECTIVISM AND CONSTRUCTIVISM

The objectivist view of the basic relationship between the individual and the environment is based on realism, which is “the doctrine that there is an independently existing world of objective reality that has a determinate nature that can be discovered” (Schwandt, 2001, p.176). Moreover, objectivist epistemology claims that knowledge, though produced by individual thought processes, is ultimately determined by real world structures and can be mapped onto learners (Jonassen, Davidson, Collins, Campbell, & Haag, 1995).

In contrast, constructivist philosophy is based on subjectivism, which holds that “all judgments … are nothing but reports of an individual speaker’s feelings, attitudes, and beliefs” (Schwandt, 2001, p.241-emphasis in original). Hence, constructivist epistemology claims that knowledge is a subjective interpretation imposed by the individual on the world. Also, since multiple individual interpretations would lead to multiple realities, no single interpretation is necessarily less valid than another (Jonassen, 1991a). Von Glasersfeld (1995) further argued that this stance is not extended to epistemological nihilism. Essentially, constructivism regards constructed knowledge as dynamic and subject to change when exposed to new perspectives during interaction. The two main schools of thought (radical and sociocultural constructivism) that emerged from this
constructivist philosophical basis are explained later in this section.

**Implications for Constructivist Learning and Teaching**

Behaviourist and cognitivist learning approaches share most of the ontological and epistemological beliefs of objectivism. From both perspectives, learning is an attempt by the student to “mirror” the structure of the external world as interpreted by the instructor and gain this knowledge, which would be common to all learners. Teaching involves the transmission of information by the instructor that had been modelled on the “real” world. The ultimate goal of learning is to achieve complete and correct understanding of “reality” (Jonassen, 1991a).

In contrast, constructivism views learning as an active process involving individual interpretations of experiences, the sharing of multiple perspectives, and negotiation of meaning through interaction in authentic contexts. Teaching primarily involves establishing a facilitator relationship with learners for the purpose of scaffolding rather than strictly controlling learning processes. Hence, the aim of learning is not to reach complete understanding of some ultimate reality, but to gain self-awareness or reflexivity that would enable the learners to attain control and responsibility of their learning processes (Duffy & Cunningham, 1996).

In online education, given the belief that learners create multiple understandings, constructivist-based distance course objectives emphasize knowledge development processes rather than products (Ertmer & Newby, 1993) with course designs that reflect the conversational paradigm (Laurillard, 2002; Romiszowski & Mason, 1996). Hence, situated learning approaches (Brown, Collins, & Duguid, 1989) and strategies to reduce transactional distance (Moore & Kearsley, 1996) between distant learners are adopted which include student control of the learning path, accessibility to communication tools for supporting interaction, and goals-free evaluation through self-assessment or reflection on learning experiences (Jonassen, 1991b).

**Sociocultural Constructivism and Online Educational Interaction**

Within the constructivist paradigm, there are divergent perspectives on learning held by two schools of thought, termed radical and sociocultural constructivism. Both approaches acknowledge that learning involves interaction and individual cognitive activity but they differ in the emphasis placed on the primacy of each element’s contribution to the learning process.

The epistemological basis for radical constructivism is widely attributed to von Glasersfeld who drew mainly from Piagetian theories on the nature of knowledge and cognitive development. The constructs of adaptation, equilibrium and interaction in Piaget’s schema theory underlie radical constructivist view of learning as a product of self-organization (von Glasersfeld, 1989) involving an iterative process whereby interaction in an experiential world produces a state of mental dissonance in the individual, to be resolved by cognitive changes. Such mental changes entail the coordination of inner experiences with outer experiences, within the specific community, which would restore the individual to a state of equilibrium (von Glasersfeld, 1997). Essentially, radical constructivism regards cognitive self-organization as the primary process in learning with the implicit assumption of interactions in sociocultural practices serving as sources of perturbations.

However, sociocultural constructivism (Vygotsky, 1962), based on Vygotsky’s work in developmental psychology, emphasizes the primacy of the social rather than individual processes in knowledge building. Hence, sociocultural theorists view learning as “enculturation into a community of practice” (Cobb, 1994, p.13) where
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Guided social participation in shared knowledge construction, mediated by technical and/or psychological tools, provides learners with scaffolding enabling higher potentiality of cognitive growth. In particular, the construct of the zone of proximal development (ZPD) is used to explain the learner’s potential capacity for intellectual growth when given guidance or scaffolding in the form of tutor/peer support through interaction. The sociocultural constructivist stance also assumes that from participation in social interaction, there is individual appropriation of the shared knowledge that s/he had a part in creating, which would in turn transform individual understandings (Rogoff, 1990). The social process is considered primary with the implicit assumption of the individual cognitive dimension. Therefore, social interactions are vital as they serve to provide opportunities for discourse and appropriation that influence intellectual development.

When guided by sociocultural constructivism, online course designs reflect the principle that group learning activities are opportunities for interaction during which there is sharing of multiple perspectives that is guided by tutor/peers, mediated by tools (such as print, web and/or CMC technologies, language), and lead to joint construction and individual appropriation of the shared knowledge. In particular, choices of CMC technologies are determined by their capabilities to facilitate interaction between distant learning parties. For instance, the asynchronous CMC mode enables delayed-time dialogue through applications such as e-mail, discussion forums and bulletin boards. Such interactions are usually text-based contributions that are composed, sent, accessed, without time and proximity constraints. However, the synchronous CMC mode requires communicating parties to be “present” at the same time for the dialogue to occur through services such as Voice over IP (VOIP) and Internet Relay Chat (IRC). Chat interactions are mainly text-based messages, composed and sent by parties simultaneously logged in chat rooms. Chat messages appear chronologically on-screen with preceding exchanges scrolling up and then off each party’s screen at a speed corresponding to the conversational pace (Werry, 1996).

Even as technology facilitates engagement between learning parties, there have been concerns over the design of online courses that resemble electronic versions of traditional correspondence courses, offering limited interactional opportunities and providing content that “are no more than print-based text dumped online” (Cashion & Palmieri, 2002, p. 55). Additionally, Bonk and Cunningham (1998) cautioned that computer-supported collaborative learning (CSCL) tools were being applied on an ad hoc basis by faculty who may not be informed by theoretical frameworks or conclusive studies on the capabilities of such tools in enhancing learning. Such a situation highlights the need to further current understanding of effective online course and learning activity design within a constructivist framework that facilitates knowledge construction processes and the transformations in individual understandings that occur when shared knowledge is “jointly produced and individually appropriated” (Rogoff, 1990, p.196).

The next section presents the case of an online undergraduate course and describes the influence of constructivist concepts on the instructional aims, conduct, virtual learning environment design, and assessment of two main learning activities.

**THE CASE: ORGANISATIONAL INFORMATICS**

Organisational Informatics (OI) is an undergraduate course available to third-year students from the School of Information Technology at Murdoch University (Perth, Western Australia). The evolution of the course to its current manifestation was reported in several publications (Lim, 2006; Lim, 2007; Lim & Sudweeks, 2008; Sudweeks,
This section presents an integrated description of the case from these main sources.

**Course Aims and Assessment**

The OI course, which focuses on computer-mediated work processes, aims to develop skills associated with the organizational aspects of information systems design and development; including the assessment and management of issues related to knowledge building organizations. The course topics include computer mediated communication, group dynamics, virtual organizations and communities, work and society in the information age, globalization, and computer-supported collaborative work. To foster active group learning, course assessment comprises mainly the deliverables associated with two learning activities: online synchronous (chat) tutorials and a team project involving the collaborative planning and presentation of a business proposal for a major function.

**The WebCT Virtual Learning Environment**

Organisational Informatics adopts a hybrid delivery design that offers face-to-face lectures and online tutorials to internal and external students who, respectively, undergo the course on-campus or via a distance learning mode. To reduce transactional distance between learning parties, there is significant use of Web Course Tools (WebCT) as a VLE where students have access to a rich variety of electronic resources for their educational needs and management of learning processes.

The VLE is organized into three main components: communication, unit materials, and administration (Figure 1). The communication component includes synchronous and asynchronous communication tools such as chat, bulletin boards, and e-mail. The administrative component supports course organizational services such as self-enrolment in tutorial groups through the Online Tutorial Signup System (OTSS), the dissemination of grades, access to the course syllabus (Learning Guide), and lecture/tutorial schedules. The unit materials component comprises three subcategories of learning materials: content materials, support resources, and assessment resources. Content materials and support resources provide access to main and secondary instructional materials such as iLecture (streamed audio links) and links to external sites. The assessment subcategory provides access to assignment resources such as project requirements and peer assessment forms.

WebCT offers a range of synchronous and asynchronous CMC technologies to mediate dialogic online interaction, which is a vital aspect of

*Figure 1. Organisational Informatics virtual learning environment (adapted from Lim 2006, p.79)*
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the two course instructional activities described below. Hence, the VLE design reflects use of information and communication technologies (ICTs) to facilitate engagement in chat tutorials and group work processes for the collaborative team project. Additionally, the ICTs support course administration and assessment; for instance, the electronic submission of coursework to the tutor via e-mail or posting of student critiques of readings (as journals) to bulletin boards.

Course Pedagogical Framework and Instructional Activities

As Organisational Informatics’ pedagogical framework is based on sociocultural constructivism (Vygotsky, 1962), it regards learning as “a cycle of interpretation, evaluation and reflection of content evolving into individual and shared knowledge” (Sudweeks & Simoff, 2000, section 3). Hence, the two main learning activities described here, namely, the online synchronous tutorials and the collaborative team project, are designed to facilitate students’ construction of knowledge through participation and reflection. Online interactions in these activities are supported by a range of WebCT CMC media including e-mail, bulletin boards, discussion forums and chat.

The Online Synchronous Tutorial

The online synchronous tutorials are held in WebCT chat rooms (Figure 2) and designed to introduce students to the theory and application of computer-mediated work processes which are directly related to the course topics. The tutorial activity aims to develop collaborative group knowledge building through active participation and sustain “students’ continuous engagement in discovering and applying knowledge and skills in the context of authentic problem solving” (Sudweeks, 2004, p.92). The maximum number of students in each tutorial group is usually set at 16 and there is a tutor for each group. All groups undergo equivalent learning activities. Student preparation for the tutorial activity is supported by VLE resources such as the Reflective Journals which states the requirements for the critique; Guidelines for Tutorial Presenters which states the responsibilities of the presenter; and Ecoms Guidelines which highlights CMC conventions and netiquette.

As described in Lim (2006; 2007), the weekly chat tutorials are conducted in a seminar style, with a tutor-facilitator and one or two student presenters moderating the discussion. The presenter role is rotated among all the students in each tutorial group. In greater detail, presenters moderate a ½ hour discussion slot each in the one-hour tutorial session based on their critiques of the week’s readings. During the tutorial, the presenter starts the discussion by highlighting the main issues in the selected readings, moderates and extends the discussion with questions, and encourages participation by all. Throughout the session, the tutor is present as a facilitator to evaluate the presenter’s performance and the quality of
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contribution by other students. The other students are expected to participate actively in discussions, guided by peers’ critiques as journals posted in bulletin boards prior to the tutorial session and evaluate the presenter with the aid of the archived discussion logs (Figure 3).

In congruence with the learning activity’s pedagogical objectives, tutor/peer assessment of contribution emphasize participation quality, extent of collaborative effort, and sense of responsibility displayed. Essentially, the OI course’s constructivist pedagogical framework is reflected in the tutorial activity design that involves critical review of readings, peer/tutor scaffolding of learning, dialogic exchange of multiple perspectives, and student reflection on learning.

The Collaborative Team Project

In conjunction with the weekly chat tutorial activity described earlier, the students are involved in a semester-long collaborative team project that requires the development of a business proposal for a major function by small teams in each tutorial group. Reflecting the course constructivist pedagogical framework that aims to sustain students’ continuous engagement in discovering and applying knowledge and skills in authentic

Figure 3. Tutorial logs (adapted from Lim 2006, p.85)

<table>
<thead>
<tr>
<th>Group No.</th>
<th>Tutorial Day/Time</th>
<th>Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>Monday 10:30</td>
<td>201314151617181910111213</td>
</tr>
<tr>
<td>Group 4</td>
<td>Monday 19:30</td>
<td>201314151617181910111213</td>
</tr>
</tbody>
</table>

Figure 4. Communication diary for a safari function in team project (Sudweeks, 2003, p.177, reprinted with permission)
problem solving contexts, the project activity design fosters critical reading, thinking and argumentation skills. Preparation for the team project is supported by VLE resources such as online communication tools which enable interaction between team members and the delivery of the proposal presentation, as well as unit materials which include sample projects, main readings and peer assessment forms.

More specifically, the number of students in each project team is capped at four and four roles for team members are defined: Client, Consultant, Researcher, and Presenter. The Client is responsible for specifying the detailed requirements and budget for the function. The Consultant prepares the implementation steps and cost breakdown for the proposed function. The Researcher maintains a project diary and records the use of each communication medium (Figure 4). Specifically, the diary records the time, frequency, topic, and team members’ reflections on the effectiveness of the communication medium in facilitating each type of communication topic (Figure 5). The Presenter integrates the project information and prepares an online presentation of the proposal to the entire tutorial group at the end of the semester. Typical functions that teams have selected include weddings, funerals, safaris, conferences, product launches, 21st birthday parties, concerts, and movie premiers. Throughout the project timeframe, a tutor and the course coordinator are available to scaffold the learning process through consultations via e-mail and the team discussion forums.

The unique aspect in the design of this learning activity lies in its restriction of communication media use among team members to only text-based electronic communication that encompasses e-mail (private and WebCT e-mail), bulletin boards, discussion forums, WebCT chat rooms, Internet Relay Chat (IRC), I Seek You (ICQ), Instant Messaging (IM) and Short Message Service (SMS). Such a restriction on text-based electronic communication media usage for supporting interaction between team members serves two main pedagogical purposes. First, this instructional strategy provides a level playing field for students studying in different modes (internal or external, part-time or full-time) and in different locations (intrastate, interstate and internationally). Second, it enables the practical application of theoretical issues covered in the course that are associated with the nature of computer-mediated communication, computer-supported collaborative work, and the dynamics of virtual work groups and organizations.

Moreover, with the definition of team member roles, the project has a clear structure and division of tasks while reinforcing both interdependency and accountability (McGookin, 2002) among

Figure 5. Reflections on effectiveness of IRC use in team project (Sudweeks, 2003, p.177, reprinted with permission)
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members which are essential for the occurrence of peer scaffolding or learning support. The sense of accountability is further strengthened by tutor and peer assessment of contribution whereby the project (the online presentation and project documentation) is graded as a team effort by the tutor and each member initially receives a common grade, which may be adjusted after taking into account the students’ evaluation of their members’ contributions to the project.

THE RESULTS: SCAFFOLDING AND APPROPRIATION OF KNOWLEDGE

The constructivist pedagogical orientation of the OI course assumes that the design of an effective online course provides interactional opportunities in tandem with scaffolding that guides learning, leading to joint construction and appropriation of new knowledge. Hence, it is essential to evaluate the extent to which the course instructional activities are perceived to foster such active collaborative learning processes. This section reports survey findings on student experiences of the online synchronous tutorials and collaborative team project described earlier. The results form the basis for further discussion on the effectiveness of the two constructivist-based course activities in facilitating collaborative learning.

Results reflecting concepts of scaffolding and appropriation of shared knowledge presented here are integrated from two wider studies (Lim, 2006; Sudweeks, 2003). In both qualitative studies, the OI course is characterized as a particularly informative case (Stake, 2000; Yin, 1994), enabling an instrumental case study of “teaching and learning in one setting … It is highly personalized because teaching and learning are highly personalized … The system boundaries are not the skins of people, but are the boundaries around a particular experience” (Stake, 1988, p.257). Additionally, a common assumption is held that scaffolding and appropriation of knowledge in online collaborative learning processes are empirically observable through examining participant self-reflections on their learning experiences. Furthermore, the methodological approaches adopted in both studies are complementary in the following respects: (a) use of the survey method for gathering self-reports of learning experiences; (b) determination of the unit of analysis as the group at two levels, namely, the entire cohort of students enrolled in the OI course and the finer level of the tutorial group which enabled comparative enrolled in the OI course and the finer level of the tutorial group which enabled comparative analysis; and (c) application of descriptive statistical analysis to the quantitative responses.

Scaffolding and Appropriation in Online Synchronous Tutorials

At the end of the teaching semester, a non-anonymous web survey was made available to 23 students from two chat tutorial groups resulting in 21 responses representing return rates of 93% (Group 1) and 89% (Group 4). The questionnaire included open-ended and closed questions on various aspects of the chat tutorial experience. Responses to closed questions were pre-coded by the survey software and descriptive statistical analysis was applied. Issues of content and construct validity were addressed at the pre-test and refinement stages of the survey development process, with modifications made that improved question clarity and instrument layout. A subset of results from Lim (2006) are presented here on student experiences of peer scaffolding defined as the extent of learning support perceived to be available from peers (other students) on clarifying content issues during tutorial discussions; and appropriation of shared knowledge defined as the attainment of learning from contributions to discussions.
Peer Scaffolding in Chat Tutorial Discussions

Peer scaffolding in chat tutorial discussions was measured by two questions on the availability of clarification and different ideas from other students in the tutorial group. The respondents indicated their extent of agreement on a scale from Strongly Agree (SA) to Strongly Disagree (SD), with an Unable to Judge (UJ) option for some questions. A between group comparison (Figure 6) found greater agreement (SA&A) among G4 respondents (100%) on the availability of clarification and different ideas from peers compared to G1 (84.6%).

Appropriation of Shared Knowledge from Chat Tutorial Discussions

The appropriation of shared knowledge was measured by two questions on the perception of attainment of learning from peer contributions to discussions. Figure 7 shows:

- all G4 respondents reported that they learnt from other students’ contributions compared to 92.3% in G1.
- a small difference in the percentage of respondents from both groups who reported that other students learnt from their contributions to the discussion.

Scaffolding and Appropriation in the Collaborative Team Project

A similar survey on the collaborative team project was administered at the end of the semester to all the teams resulting in 49 student respondents. The survey covered different facets of student experiences with team communication, group dynamics, their perceptions of the project and the overall online learning process. A selection of results from Sudweeks (2003) are presented here on student experiences of peer scaffolding defined as the extent of learning support perceived to be available from team members during collaborative activities within teams; and appropriation of shared knowledge defined as the attainment of learning from contributions to team activities.

Peer Scaffolding in Team Project

The extent of peer scaffolding perceived to be available from the online communication within teams was measured by two questions related to the exchange of views or information between team members. The respondents indicated their extent of agreement on a 5-point scale from Strongly Agree (SA) to Strongly Disagree (SD)

Figure 6. Extent of peer scaffolding in chat tutorial discussions

<table>
<thead>
<tr>
<th>Questions</th>
<th>Group</th>
<th>SA*</th>
<th>A*</th>
<th>D*</th>
<th>SD*</th>
<th>UJ*</th>
</tr>
</thead>
<tbody>
<tr>
<td>The other students clarified issues on content that were raised during the discussion</td>
<td>G1</td>
<td>15.4%</td>
<td>69.2%</td>
<td>15.4%</td>
<td>0.0%</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>G4</td>
<td>50.0%</td>
<td>50.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>**</td>
</tr>
<tr>
<td>The other students contributed different ideas to the discussion</td>
<td>G1</td>
<td>15.4%</td>
<td>69.2%</td>
<td>15.4%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td></td>
<td>G4</td>
<td>37.5%</td>
<td>62.5%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

*SA=strongly agree; A=agree; D=disagree; SD=strongly disagree; UJ=unable to judge.
**The UJ option was not available for the first question.
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Figure 7. Appropriation of shared knowledge in chat tutorial discussions

<table>
<thead>
<tr>
<th>Questions</th>
<th>Group</th>
<th>SA*</th>
<th>A*</th>
<th>D*</th>
<th>SD*</th>
<th>UJ*</th>
</tr>
</thead>
<tbody>
<tr>
<td>I learned from other students’ contributions during the discussion</td>
<td>G1</td>
<td>30.8%</td>
<td>61.5%</td>
<td>7.7%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td></td>
<td>G4</td>
<td>37.5%</td>
<td>62.5%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>I helped other students learn through my contributions during the discussion</td>
<td>G1</td>
<td>7.7%</td>
<td>46.2%</td>
<td>23.1%</td>
<td>0.0%</td>
<td>23.1%</td>
</tr>
<tr>
<td></td>
<td>G4</td>
<td>12.5%</td>
<td>37.5%</td>
<td>25.0%</td>
<td>0.0%</td>
<td>25.0%</td>
</tr>
</tbody>
</table>

*SA=strongly agree; A=agree; D=disagree; SD=strongly disagree; UJ=unable to judge.

Figure 8. Availability of peer scaffolding in team project

<table>
<thead>
<tr>
<th>Questions</th>
<th>SA*</th>
<th>A*</th>
<th>D*</th>
<th>SD*</th>
<th>N*</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am more likely to share my own opinion in an online group</td>
<td>14.3%</td>
<td>24.5%</td>
<td>18.4%</td>
<td>8.1%</td>
<td>34.7%</td>
</tr>
<tr>
<td>I am more likely to discover what other students think about a given topic in an online group</td>
<td>12.2%</td>
<td>34.7%</td>
<td>20.4%</td>
<td>6.2%</td>
<td>26.5%</td>
</tr>
</tbody>
</table>

*SA=strongly agree; A=agree; D=disagree; SD=strongly disagree; N=no opinion.

Figure 9. Attainment of learning in team project.

<table>
<thead>
<tr>
<th>Questions</th>
<th>SA*</th>
<th>A*</th>
<th>D*</th>
<th>SD*</th>
<th>N*</th>
</tr>
</thead>
<tbody>
<tr>
<td>I was able to understand many of the theoretical concepts taught in this unit by doing this project</td>
<td>14.3%</td>
<td>26.5%</td>
<td>10.2%</td>
<td>0.0%</td>
<td>49.0%</td>
</tr>
<tr>
<td>After this project, I have a better understanding of working in a virtual team</td>
<td>28.6%</td>
<td>51.0%</td>
<td>4.1%</td>
<td>0.0%</td>
<td>16.3%</td>
</tr>
<tr>
<td>I found the group project to be an effective learning experience</td>
<td>20.4%</td>
<td>57.2%</td>
<td>4.1%</td>
<td>2.0%</td>
<td>16.3%</td>
</tr>
</tbody>
</table>

*SA=strongly agree; A=agree; D=disagree; SD=strongly disagree; N=no opinion.

and No Opinion (N). Figure 8 shows that most respondents agreed (SA&A) that they shared their views with other team members (38.8%) and were able to receive information or learn more about other members’ opinions (46.9%).

Appropriation of Shared Knowledge from Team Project

The appropriation of shared knowledge was measured by three questions covering perceptions of attainment of learning from contributions to the project. Results in Figure 9 show that:

- more respondents (79.6%) agreed (SA&A) that by contributing to the project, they achieved better understanding of working in virtual teams than the theoretical concepts taught in the course (40.8%).
- most respondents (77.6%) agreed (SA&A) that engagement in team project was an effective learning experience.

DISCUSSION AND RECOMMENDATIONS

The sociocultural constructivist learning perspective broadly assumes that knowledge building
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occurs during interaction which involves the sharing of multiple perspectives on experiences by members of the learning community. Such dialogic engagement, in formal instructional contexts, establishes a zone of proximal development where greater intellectual growth is enabled by the availability of scaffolding as guidance from peers and/or tutors, mediated by technology and language, leading to appropriation of the constructed meanings. To evaluate the extent to which the OI course fosters collaborative-constructivist learning processes, student experiences of two online instructional activities in a case study were examined.

Overall, for the chat tutorial activity, the findings from a comparative group analysis established that peer scaffolding was available to varying extents as efforts in clarification and provision of different ideas during discussions. In other words, even as there was peer support in both tutorial groups, there was also greater collaborative peer learning present in G4 compared to G1. Even though it is beyond the scope of this study to determine the exact form or extent of knowledge constructed, the attainment of learning perceived by respondents was examined to ascertain if there was appropriation of shared knowledge during the online learning process. Most of the respondents reported individual attainment of learning from other students’ contributions during discussions. However, the results were equivocal regarding mutual attainment of learning since half the respondents in both groups disagreed or were unable to judge whether their peers had learnt from their contributions.

Results for the team project activity showed that peer scaffolding was also present as the exchange of information or opinions through online communication media within teams, albeit at a lesser degree compared to perceptions of learning support available in chat tutorial discussions. While engagement in the team project was largely reported to be an effective learning experience, more respondents indicated individual attainment of learning as achieving greater understanding in the actual practice of working in virtual teams than better comprehension of the abstract concepts taught in the OI course. This result is not unexpected and may be attributed to the purpose of the activity which requires the transfer of theoretical knowledge acquired, in course topics such as CMC processes and virtual work group dynamics, to application in the authentic context of developing a business proposal with virtual team members.

A comparison of the results from both online instructional activities revealed a greater extent of agreement on the presences of peer scaffolding and individual appropriation of knowledge in the chat tutorial activity compared to the team project activity. This finding may be explained by the nature of the learning activities and questionnaire design. In the team project, the sharing of multiple perspectives and negotiation of meaning occurred within teams that comprised four members while during chat tutorial discussions, participants had recourse to the shared knowledge of the entire tutorial group (9-14 students). Regarding the questionnaire design, the No Opinion option was available in most team project survey questions while the Unable to Judge option was offered in only one of 17 sets of questions in the chat tutorial activity survey. In survey perception analysis, it is acknowledged that the provision of neutral options can lead to errors of central tendency manifested as the consistent selection of mid points in rating scales due to the establishment of a comfortable pattern of responding reinforced by unvarying response format (Herzog & Bachman, 1981).

To account for the equivocal results regarding mutual attainment of learning from the chat tutorial activity (Figure 7), it could be argued that since the UJ option was limited to only one set of questions in the survey, the selection pattern for the question: I helped other students learn through my contributions during the discussion, validated the design assumption that respondents may not have sufficient information to provide an accurate
answer pertaining to observed behaviour of other participants. Hence, it is likely that the equivocal results indicate that respondent difficulties in judging others’ attainment of learning could be due to factors other than instrument design.

The results presented here on peer scaffolding and individual/mutual attainment of learning present certain possibilities for modifying the two course activities to enhance overall student experiences of online collaborative group learning processes. First, the reported inability by some respondents to provide an accurate answer on the behaviour of other participants during the chat tutorial discussions highlights an area for revising current assessment practices in the OI course. It is recommended that the peer assessment of contribution for both instructional activities, which is submitted by each student to the tutor at the end of the semester, be disseminated to other team or tutorial group members. The availability of peer feedback may raise individual student’s awareness of the impact of one’s own contributions on scaffolding the learning processes of others. Second, given that respondents in the team project survey reported better understanding of the actual practice of working in virtual teams than the abstract concepts taught in the OI course, it is recommended that regular online review meetings be held with each project team, during which the tutor can construct explicit links between the theory and practice of working in virtual groups.

FUTURE RESEARCH DIRECTIONS

The study presented in this chapter spans a number of fields such as education, information and communication technology, educational technology, and instructional design, which presents several potential areas for future research in these areas.

The single case design adopted by this study enabled an in-depth investigation of one particularly informative case. Although such cases are, by definition, not easily available, there is scope for further research with a methodological design that compares the OI course with other courses offering similar, though not necessarily identical, learning experiences. In addition, the examination of interaction in the chat tutorial activity could be expanded to include those supported by the range of face-to-face, online asynchronous and synchronous instructional environments afforded by the OI course. Such research efforts could yield valuable insights on the appropriate integration of the various CMC technologies in the design of distance learning programmes.

Given that the equivocal results on mutual appropriation of knowledge during chat tutorials were not likely to stem from instrument design, they may be attributed to other factors such as the CMC medium. Future research could enable a clearer understanding of how the text-based and synchronous characteristics of the chat medium affect group learning processes. A final possible area for future investigation is to measure the relationship between student experiences of the online collaborative group learning processes and the quality of their coursework for both instructional activities in terms of the grades achieved.

CONCLUSION

This chapter presented a study examining the application of CMC technologies in a course framed by a constructivist pedagogical framework in the context of higher education. The chapter discussed the philosophical assumptions underlying behaviourist, cognitivist, and constructivist learning approaches that influenced interpretations of the form and function of educational interaction. Within the constructivist paradigm, the divergent perspectives on learning held by the radical and sociocultural constructivist schools of thought were contrasted. A qualitative case of an online undergraduate course shaped by sociocultural
Constructivism was presented, which included a detailed description of the course objectives, virtual learning environment design and two main online learning activities facilitated by synchronous and asynchronous CMC technologies. In particular, the influence of sociocultural constructivist principles on the aims, conduct and assessment of the online synchronous tutorials and the collaborative team project were described.

Survey results were presented and discussed on student experiences of collaborative learning and group work processes in the two online learning activities. Findings established that peer scaffolding was available during chat tutorials discussions and through online communication within the project teams. Similarly, there were perceptions of individual appropriation of knowledge from online interactions in the chat tutorial and team project activities. While there was greater extent of agreement on the presences of peer scaffolding and individual appropriation of knowledge in the chat tutorial activity compared to the team project activity, the findings were attributed to the questionnaire design and nature of the learning activities, which presented certain possibilities for modifying course activities to enhance overall student experiences of online collaborative-constructivist group learning processes.

Although the knowledge gained from this single case study is not intended for generalization to wider populations, the implications drawn from the findings may be extrapolated, in the form of recommendations, to similar contexts. Based the research presented, this chapter offered specific recommendations regarding the design of constructivist-based instructional activities to enhance overall student experiences of online group learning processes, which may be of interest to CMC researchers, higher education faculty, other professionals and staff involved in distance learning programmes.

REFERENCES


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