

Understanding the Quality of Students' Interactions through Computer Conferencing in Higher Education from the Social Constructivist Perspective

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Abstract: This paper discusses the processes of interactions among learners in higher education through computer conferencing, and provides information regarding the quality of their learning experience. In order to investigate this phenomena, the social constructivist perspective with the metaphor of "persons-in-conversation" was undertaken as a conceptual framework. The attributes of computer conferencing and its relationship to social constructivism, point to interactions as essential processes through which negotiation of meaning and co-construction of knowledge occur. To address the scarcity of research using qualitative interpretive methods in computer conferencing, constructivism as a referent for the research method was used. The principles of grounded theory was employed in the analysis of computer transcripts resulting in the emergence of seven themes. In order to verify the hypothesis pertaining to the themes, additional questions were formulated and students' end-of-semester evaluation was used. Analysis suggest that the activities occurring within the themes are dynamic interactive processes against which students' conversation take place.

Purpose of the Study

This study aims to address the fundamental question: "What is the quality of interactions and the subsequent learning experience among learners in higher education in computer conferencing?" In order to investigate these qualities, the social constructivist perspective was undertaken such that the metaphor of "persons in conversation" (Ernest, 1995, p. 480) provided a framework for the study. Within this framework, the extent to which a community of learners is established is investigated within which, the nature of discourse within the community is analysed.

Motivation for the study

As a graduate student, the first author had the opportunity to take on-line courses that were supported with computer conferencing and the world wide web. This particular course under study was conducted wholly on-line. This was a new learning experience for her and she subsequently went on to assist the second author in moderating the on-line course. The second author is engaged in designing and facilitating on-line learning courses using social constructivism as a referent for her teaching in which the focus of the educational experience is on the web of interaction between the facilitator and her students and among students. The result of their exposure to on-line education led to their interest in research in this area of teaching and learning.

Significance

A review of recent literature shows that the principal issues where studies into computer conferencing has largely been conducted relate to application oriented issues (Mason, 1992), and evaluation into the quality of an on-line conference (Romiszowski and Mason, 1996; Gunawardena, Lowe and Anderson, 1997). These include investigations into the amount and patterns of participation showing the interrelationship (or threads) among messages submitted to a conference (Ahern, Peck and Laycock, 1992; Howell-Richardson and Mellar, 1996; Hillman, 1999), comparative patterns of participation among learners from varying backgrounds (Levin, Kim and Riel, 1990), and participation satisfaction regarding the medium of communication. Mason (1992), in reviewing methodological approaches used in evaluating CMC, reports that the majority of studies came out of a quantitative/positivist paradigm, using techniques such as survey questionnaires, interviews, empirical experimentation and computer-generated statistical manipulations which do not shed much light on the quality of learning taking place.

Recent researchers however, have begun to investigate into more specific aspects of students' learning, including higher order learning (Fabro and Garrison, 1998), critical thinking (Bullen, 1998; Anderson and Garrison, 1995; Garrison, 1991; Newman, Webb and Cochrane, 1995) and social interchange among learners (Gunawardena and Zittle, 1997; Rourke, Anderson, Garrison and Archer, in press). These studies have exposed the small number of research, and the need to examine quality issues with regards to students' on-line learning.

In relation to this, few studies have sought to analyse the transcripts of students' on-line conferences for the purpose of investigating the quality of interactions and the quality of their learning experience using social constructivism as a referent for the investigation. This study follows initial studies carried out by Gunawardena, Lowe & Anderson (1997) and Kanuka & Anderson (1998) on professional development conferences with learners of roughly equal skills and knowledge in which they sought to analyse the processes of interaction among participants. This study seeks to investigate and understand the on-line construction of students' knowledge in higher education, through an analysis of their conference transcripts, end-of-semester evaluation and further questions which were formulated from hypothesis generated from the analysis.

Conceptual Framework

Using social constructivism as a referent in investigating students' educational experience, two interrelated elements are seen as essential to the investigation of the quality of the learning experiences: the establishment and presence of a community of learners, and the nature of discourse within the community. Within this framework, education is seen as a social learning experience (Garrison, 1993) in which negotiation of meaning and co-creation of knowledge occur. Operationally, we define interaction as the experience during which two or more parties engage in a collaborative effort to negotiate meaning and to form a unified knowledge. In the context of computer conferencing, interaction and communication are essential processes through which learning occurs. Kaye (1989) states that "conferencing is primarily about interaction" (p. 16).

The importance placed on interaction points to the fact that two kinds of knowledge creation take place in a shared learning experience such as that in computer conferencing. Knowledge is created at both the social - the level of the community - and the individual who also creates his or her own understanding. "Social constructivism regards individual subjects and the realm of the social as interconnected" (Ernest, 1995, p. 479). This means that at all times, knowledge is both social and individual in a way that Tobin and Tippins (1993) describe as "a dialectical relationship existing between the individual's contribution to knowledge and the social contribution" (p. 6). For Dewey (1938), education is based on the interaction of an individual's internal and external conditions. This means that interaction and the situation during which one experiences the world cannot be separated because the context of interaction is provided by the situation. This idea of communication suggest the intersubjectivity between the individual, other people and the surrounding environment. As Vygotsky (1978, cited in McIsaac & Gunawardena, 1996) postulates, one's social environment is a critical factor in one's cognitive development. As such, knowledge should be seen as a matter of conversation and of social practice (Rorty, 1979 in Philips, 1997).

Following this conceptual framework, interaction and communication take precedence over individual learning in this on-line community of learners.

Research Design and Procedures

The research approach was underpinned by a constructivist theory of knowledge in which the aim of the inquiry is to investigate and understand the quality of the learning experience on-line. A constructivist epistemology views knowledge as a construct of individual's understanding (Guba and Lincoln, 1994). When individuals come together, such as in a learning environment, their construction undergoes continuous revision due to cognitive conflict which occurs as a result of different constructions among individuals. Through the hermeneutical/dialectic process, knowledge becomes more informed and sophisticated.

In view of this study which aims to investigate the processes of social negotiation and co-construction of meaning, this methodology is considered the most appropriate. It recognises individual's construction of knowledge to be an interpretation and not a correspondence to an external reality (Von Glasersfeld, 1990).

This on-line unit is a postgraduate unit for science and mathematics teachers. Nine students undertook this unit, including the first author, and it was moderated by the course instructor who is the second author. The students come from Canada, Vanuatu, New Zealand and various parts of Australia; however, except for the student from Canada, all other participants were residing in Australia during the course of the unit.

The research questions, both original and emergent, formed the basis for the methods by which data were collected. The data were pieced together to answer research questions that evolved. Consequently, the research questions and research methods were emergent and self-reflexive. The research methods include transcript analysis using the principles of grounded theory, participants' end of the semester evaluation, and open-ended questions which were formulated from the hypotheses generated from the transcript analysis.

Transcript Analysis: First, a critical review of a currently available interaction analysis model was conducted in which it found that Gunawardena, Lowe and Anderson's (1997) model to be the most promising start for their concept of interaction is based on the principles of social constructivism. This model traces the construction of knowledge in social learning through five phases. Second, the researchers went through the conference transcript once in order to familiarise themselves with the manner of interaction among the students. Having observed the patterns of interaction among the students, the data was found to be incongruent with the categories from the model. Rather than impose the categories (from the model) onto the data at the early stages of analysis, the researchers felt that it would be more useful to let the categories emerge from the data. Literature on social constructivism and grounded theory were used to analyse emerging patterns, themes, phases, and concepts relating to the social construction of knowledge. From the transcript analysis, hypotheses were formed in which participants' end of the semester evaluation was analysed to verify the hypotheses.

Open-ended questions: This instrument was used in order to further confirm or disconfirm the hypotheses formed through the transcript analysis. From the transcripts, it appeared that some phenomena pertain to all participants while others pertain to certain individuals. As such, two categories of questions were formulated, one relating to all participants, and the other, different questions relevant to the respective participants. From these questions, student's perception regarding their learning experience was also investigated.

Findings and Implications

Analysis from the transcripts and end-of-semester evaluation point to the existence of seven themes pertaining to the ways students learn on-line. These themes represent dynamic activities occurring within them with each theme relating to the other interactively. In assuming the metaphor of "persons in conversation", the transcripts represent students' conversation with each other on-line; as conversations do not take place in separate phases, so too the themes which emerged from their conversation are not distinct and separate. The seven themes are: the learning environment, community of learners and the social presence of others, students' background and prior knowledge, reflective thinking, peer-learning and students-centred learning, constructing knowledge, and the role of the facilitator. Within the social constructivist framework in which this study was conducted, these themes can be grouped further into two main categories: *learning communities* and *discourse within the community*.

In order to make meaning from students' conversation and henceforth, their learning experience, the relationship between the themes in the respective categories can be understood from the perspective of theoretical codes (Glaser, 1978). Theoretical codes allow for themes to be organised so that the relationship between the themes can be clarified in order to understand the processes of students' learning experience. Seen in this perspective, the initial role played by the facilitator appears to have set *the learning environment* that enabled a *community of learners* to be formed. Within the community, students' *background and prior knowledge* became apparent, was

emphasised and played a key role in their discourse. Together, these form the total background against which students' discourse took place. This environment in which interaction transpired is the *learning community*.

In relation to their *discourse in the learning community* as reflected in the Activity Room, students *reflect* on the readings in relation to their own experiences as well as their colleagues' responses in relation to the readings. From their reflections, they then share their experiential knowledge and put forward their responses to the readings, and occasionally to their colleagues', using different forms of *communicative strategies*. Thus, there was increase in *peer-learning* based on one another's experiences and perspectives. It is worth noting that the learning community and the discourse within the community are not separate and distinct categories; the community both affects the discourse, and is affected by the discourse, creating a dialectical relationship.

Community of Learners. One of the second author's intentions when she designed this unit was to develop a community of learners within which peer-learning and student-centred learning would occur. In view of this, she guided the first two weeks of discussion which enabled a community to be formed. Immediately following the second week, students' interaction with one another could be seen to take place within the learning environment that she created. Later on, against this environment and through peer-learning, they established their own environment for conversation. The importance of the learning environment for the development of a community could be seen from this student's end-of-semester evaluation, "The fact that we introduced ourselves and a little historical information set up a rapport between the group. This allowed me to feel more at ease, particularly as I don't have a strong technological background." Students' personality as revealed in the self-introduction activity initiated by the facilitator, is important in helping students know who their colleagues are, and the way in which they will consequently communicate with one another. As this student said "I started the unit cautiously. I was testing the waters because I needed to know who my coursemates were as they would influence the way in which I contribute to the activity room."

The importance of a community of learners is also seen to be significant to students' interactions in the following ways: (a) It helped to create an equitable learning environment. Students do not feel threatened by one another's ideas and are able to share their knowledge freely. (b) It enabled for social exchanges among students in addition to the more formal discussions. Through their social chats, students learn from one another. This was acknowledged by the facilitator when she said, "I really enjoyed the brief personal interactions...which makes me think that it is valuable enough to have it in the activity room and not as an e-mail. After all, this is part of the learning process, as it is not only in the information exchange[s] but also in the personal exchange[s]" (Activity No. 115). (c) Students do not feel themselves isolated in their learning experience, and regard one another's experiences and ideas as resources towards their own learning.

However, while most students felt satisfied with the informal learning environment, there were others who felt that a more formal situation would be more suitable for learning. Thus, they do not view their colleagues' social chats as sources of knowledge, but instead regard them as mere general chatter. One student indicated that her colleagues' "responses became more of a general chat...they were too colloquial."

Evidence of students collegial attitude towards one another can also be seen from the way in which they use the activity room for purposes beyond formal discussions. In addition to the social exchanges, they also share their classroom ideas, on-line resources, support each other in their learning difficulties especially those pertaining to technology, and encourage one another. The transcripts reveal that students who are learning on-line for the first time generally needed more support from their peers than those who are more experienced with this form of learning. However, they differ in their perception regarding the support they received from their peers.

Discourse within the community. Students' conversation indicate that they are strategies which they used in order to communicate their ideas to one another depending on their intent and the context within which they are used. It is also true that the purpose of their conversation sometimes result in unintended outcomes, or lead to other forms of conversation. The transcripts reveal that three groups of students exist with regards to their on-line learning experiences, beliefs and attitudes in relation to the use of technology in the classrooms. These factors are seen to relate to the types of conversation and strategies they used in order to promote their ideas and opinions.

Students in group one are experienced teachers with more than 15 years of teaching experience. Generally, they are also experienced on-line learners with a positive attitude towards the use of computers in education. In their discourse, they often discuss the readings in relation to their prior experience as well as use them as justifications for their opinions. They are confident learners eager to put forth their arguments. The questions they posed to their colleagues are generally intended to obtain ideas and resources for their own classroom practices. They form the biggest cohort of students. Students in group two are both first-time on-line learners who are respectively naïve in matters pertaining to computers, and have no teaching experience. However, they are eager to learn from their colleagues and are open to new ideas. This can be seen from one of their transcripts, "...[I am] interested in capitalising on the use of educational software in enhancing learning and understanding and [I] hope to learn from

all of you” (article no. 12). The consequence resulting from their lack of experience see them discussing the topics either from a personal perspective, or from a theoretical viewpoint. The questions they pose to their colleagues are often intended to deepen their understanding regarding the topics, and to clarify conflicts of understanding. In posing their questions, they also challenge the beliefs of their colleagues. Students in group three lack experience in computers and are sceptical regarding their practical use to improve teaching and learning. Regardless of the group in which students belong, they acknowledge that they learn something new from each others’ experiences.

The importance of students’ prior experiences establish their starting point with regards to their learning. Students’ starting point is significant as it reveals where their current knowledge and beliefs are at the beginning of the semester in relation to where they subsequently are at the end of the semester, and the kinds of interactions that occur in the activity room to create this change in understanding. It has been well documented in literature (Ernest, 1995; Tobin and Tippins, 1993; Von Glasersfeld, 1990) that students’ prior knowledge and beliefs act as both a motivation and constrain to their learning. When students are faced with a concept, model or theory, they bring their experiences to bear on this information; if the information falls within their existing frame of understanding and is adequate in the context in which they are created, the information is accepted as viable. However, if their prior experiences inform them that the piece of information is not likely to be workable, it is resisted. From their conversation, it appears that students’ cognition is more open to embrace new knowledge not currently held than it is to change incorporating the differences; this can be seen both from their resistance to change as well as from the scarcity of new knowledge which comes from a shift in their cognition.

In terms of discourse from a social constructivist standpoint, students generally created opinions rather than engage in active conversation and negotiation of meaning with one another. That is, they generally proposed their own different views rather than seek clarification or challenge one another’s views through active conversation. However, closer analysis of the transcripts show that tacit negotiation was continually occurring even when participants were apparently agreeing with one another (Gunawardena, Lowe and Anderson, 1997).

These findings in relation to the two categories suggest that: 1) a sense of community sets the learning environment that enables for the sharing of multiple experiences among students. These experiences in turn, act as a rich pool of resources towards students’ learning leading to their construction of new knowledge. 2) in order that students collaboratively build and integrate new knowledge into their existing framework, or change their existing framework, instructors should formulate ways in which to transform their tacit negotiations into more active interactions through negotiation and discussion among students.

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