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Recognising and promoting collaboration in an online asynchronous discussion

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Abstract

This paper reports on a study involving the identification and measurement of collaboration in an online asynchronous discussion (OAD). A conceptual framework served for the development of a model which conceptualises collaboration on a continuum of processes that move from social presence to production of an artefact. From this model, a preliminary instrument with six processes was developed. Through application of the instrument to an OAD, the instrument was further developed with indicators added for each process. Use of the instrument to analyse an OAD showed that it is effective for gaining insight into collaborative processes in which discussants in an OAD do or do not engage. Use of the instrument in other contexts would test and potentially strengthen its reliability and provide further insight into the collaborative processes in which individuals engage in OADs. Analysis of an OAD using the instrument revealed that participants engaged primarily in processes related to social presence and articulating individual perspectives, and did not reach a stage of sharing goals and producing shared artefacts. The results suggest that the higher-level processes related to collaboration in an OAD may need to be more explicitly and effectively promoted in order to counteract a tendency on the part of participants to remain at the level of individual rather than group or collaborative effort.

Introduction

Online asynchronous discussions (OADs), or web- and text-based group interactions not occurring in real time, facilitate and support many-to-many, learner(s)-to-learner(s) interaction vital to collaboration in online learning environments. Facilitating and supporting interaction potentially promotes collaboration. However, it does not guarantee it. Collaboration is more than interaction and requires 'coordinated, syn-

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chronous activity that is the result of a continued attempt to construct and maintain a shared conception of a problem' (Roschelle and Teasley, 1995, 970). Collaboration represents a 'purposive relationship', the intent of which is to 'produce something. to solve a problem, create, or discover something' (Schrage, 1995, 29), and to work together to achieve shared goals (Kaye, 1992; Roschelle and Teasley, 1995).

Thus, while it might be desirable to promote collaboration in the context of online learning through use of an OAD, such collaboration will not automatically occur simply because peer-to-peer interaction is supported and facilitated. In order for interaction to lead to collaboration in a context of online learning, specific measures must be taken to actively and consciously promote collaboration. Promoting collaboration in online learning begins with an understanding of the concept itself, followed by an understanding and recognition of how it might manifest itself in an online context. Subsequently a process of identification and measurement of its presence in that context will help determine if the interaction in the OAD led to collaboration. Finally, supports and scaffolds that move discussants in an OAD beyond interaction to collaboration will provide means to promote the latter.

The purpose of this paper is to report on a study involving the identification and measurement of collaboration in an online asynchronous discussion (OAD). A conceptual framework served for the development of a model which conceptualises collaboration on a continuum of processes that move from social presence to production of an artefact. From this model, a preliminary instrument with six processes was developed. Through application of the instrument to an OAD, **t**he instrument was further developed with indicators added for each process. The instrument was subsequently used to analyse an OAD for evidence of collaboration. Results of the analysis are reported and discussed with implications for the recognition and promotion of collaboration in an OAD.

Conceptual framework on collaboration

Collaboration begins with interaction—participants show awareness of each other's presence and begin to relate as a group. A key element at this stage is what Garrison *et al* (2000, 4) define as *social presence*: 'the ability of participants in the Community of Inquiry to project their personal characteristics into the community, thereby presenting themselves to the other participants as "real people"'. Social presence creates group cohesion, which enriches interaction. When a sense of community is formed through communicating on a social rather than just an informational level, interaction can move to a higher level and become collaborative (Henri, 1992; Garrison *et al*, 2000).

Interacting with others, then, may be seen as a first step towards collaboration, but collaboration involves more than peer-to-peer interaction. In an OAD, participants may begin by introducing themselves, and then move on to articulating their individual perspectives. In this stage, participants are aware of the presence of others, but do not explicitly reference their perspectives or solicit feedback from them. Postings at this

stage may read like a series of monologues (Henri, 1995). At a next stage, as participants are exposed to each other's viewpoints, they begin to accommodate and reflect the perspectives of others (Henri, 1995; Knuth and Cunningham, 1993; Jonassen *et al*, 1993). This stage is a prerequisite towards building knowledge and constructing new meanings (Garrison *et al*, 2000; Schrage, 1995; Alexander, 1992; Henri, 1995).

Collaborative community or group members not only share perspectives, but also challenge and refine those perspectives. As participants articulate and externalise their perspectives, areas of disagreement or conflict become explicit. This process of questioning, evaluating and criticising perspectives, beliefs and assumptions allows participants to restructure their thinking (Steeples *et al*, 1994; Brown and Palincsar, 1989). When individuals' perspectives are challenged, they must work together to produce shared meanings (O'Malley, 1995).

While group members develop social presence, articulate, accommodate and co-construct new perspectives and meanings, they also work together to achieve shared goals (Roschelle and Teasley, 1995). When individuals reach a stage at which they share goals, a sense of common purpose emerges. It is at this point that individuals work together and begin to move in unison towards a common direction. 'To collaborate (*co-labore*) means to work together, which implies a concept of shared goals' (Kaye, 1992, 2).

Sharing goals can lead to the production of a shared artefact, 'an explicit intention to "add value"—to create something new or different through the collaboration' (ibid.). Collaboration ultimately is realised at this stage when the shared artefact results. Until this 'something new' has been envisioned and created, collaboration is not complete. As Schrage (1995, 29) argues, 'collaboration is supposed to produce something'. Its success, he claims, 'can be measured by its results' (p. 30).

From this consideration of the concepts of interaction and collaboration, a framework and model emerge. Collaboration can be recognised by thinking of it in terms of a continuum along which six major processes or stages can be identified. The continuum moves from mere interaction towards what Schrage (1995) refers to as a 'purposive relationship', which leads to the production of a shared artefact. These six processes are: (1) *Social presence*, (2) *Articulating individual perspectives*, (3) *Accommodating or reflecting the perspectives of others*, (4) *Co-constructing shared perspectives and meanings*, (5) *Building shared goals and purposes* and (6) *Producing shared artefacts*. Figure 1 presents a model of collaboration, conceptualised as a series of processes or stages that move from interaction to collaboration. The earlier processes are prerequisites for the later ones: the highest levels of the model cannot be reached without moving through the lower levels. However, participation at the lower levels does not guarantee that the higher levels will automatically be reached. Simple interaction is a necessary prerequisite to full collaboration, but simple interaction may occur without ever moving forward to higher levels of collaboration.

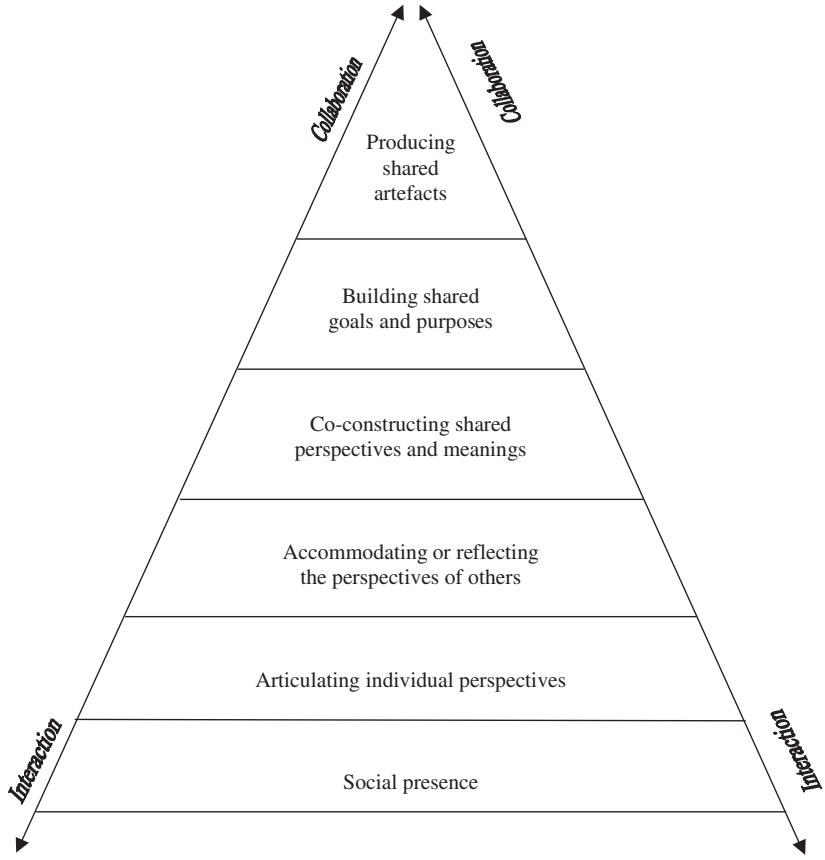

Figure 1: Collaboration model

Background

The OAD used in the development of the instrument and subsequently analysed was drawn from a web-based learning module called *Solving Problems in Collaborative Environments* (SPICE) (Murphy, 2000). SPICE was designed to help practitioners such as social workers, nurses or teachers advance their practice through a process of collaborative problem solving (CPS). Eleven pre-service teachers of French as a second language used the module during a four-week period in an undergraduate methods course. The module was delivered in a WebCT™ environment and relied on use of an OAD to promote CPS.

SPICE uses a three-step approach to CPS. The first two steps, *Consult* and *Gather*, support problem formulation by exposing participants to multiple perspectives. Participants view video and audio segments of interviews with practitioners and access an online

bibliography of research articles related to the problem. The final step in the process, *Act*, provides participants with an opportunity to present solutions to the problem. A *Shared Workspace* is used to upload a document such as a short- or long-term action plan, a description of an activity, or a lesson plan. Participants can view and download each others' solutions.

Each of the three steps in the SPICE approach is followed by engagement in *Shared Reflection* using an OAD, in which participants are invited to describe how the multiple perspectives presented in the *Consult* and *Gather* phases differ from or resemble their own. Participants are also asked to compare their own perspectives with those of other participants. Following the *Act* step, participants have an opportunity to discuss one another's proposed solutions in the OAD.

Development of the instrument

The model of collaboration served as a basis for the initial development of an instrument designed to assist in the identification and measurement of collaboration in an OAD. The model's six processes, described above, also serve as the main categories for the instrument. The principal investigator and her assistant analysed the transcript using the six processes as a framework and derived specific indicators for each of these six processes. The indicators were derived by first identifying the types of statements participants made in their postings—for example, posing a question, sharing information about one self or disagreeing with another participant. When the entire transcript had been read and all the statements had been categorised, the resulting list of indicators was compared with the six major processes. The individual indicators were then associated with the process they supported. Letter codes were assigned to each of the processes and indicators. The resulting instrument is displayed in Table 1. Examples from the OAD are given for each indicator in order to promote greater reliability in other applications of this instrument.

Results of analysis of the SPICE OAD

Once the list of indicators had been established, the instrument was finalised. The researcher subsequently made use of this instrument to identify and measure collaboration in an actual OAD. The same OAD used in the development of the instrument was analysed using the instrument. Each of the 103 participant-authored messages in the transcript of the SPICE OAD was coded with the letter codes shown in Table 1. The results of this coding are displayed in Table 2. The message was used as the unit of analysis, and since each message might contain several indicators, the totals in Table 2 add up to more than 103.

Discussion of the results

Table 2 shows the number of messages in which each of the indicators of collaboration occurred. While many messages showed evidence of interaction in the phases *Social presence* and *Articulating individual perspectives*, fewer messages showed evidence of collaborative processes in the *Accommodating or reflecting the perspectives of others* and *Co-constructing shared perspectives and meanings* phases. Only one message showed evidence

Table 1: Instrument for the identification and measurement of collaboration in an OAD

General processes	*Specific indicators*	*Code*	*Examples of indicators*
Social presence (S)	Sharing personal information (P)	SP	'I went on to do a B.A. with a double major in sociology.'
	Recognising group presence (R)	SR	'Hi everyone!'
	Complimenting/expressing appreciation towards other participants (C)	SC	'I think you've raised a really interesting question.'
	Expressing feelings and emotions (F)	SF	'It all seems a little overwhelming for me as a future teacher to know that this is what I am walking into.'
	Stating goals or purposes related to participation (G)	SG	'During this interesting project, I would like to learn more by sharing and discussing ideas.'
	Expressing motivation about project or participation (M)	SM	'I think this project will be quite interesting.'
Articulating individual perspectives (I)	Statement of personal opinion or beliefs making no reference to perspectives of others (O)	IO	'In my opinion, Core French Programs in both Junior High and High Schools need further development and revision, especially the homework component and formative tests.'
	Summarising or reporting on content without reference to the perspectives of others (S)	IS	'The article compares the confident and less confident students to speak in a French class.'
Accommodating or reflecting the perspectives of others (P)	Directly disagreeing with/ challenging statements made by another participant (D)	PD	'To comment on a reflection made by another participant stating that there is no room in a classroom for the teacher to make mistakes, I would like to disagree.'
	Indirectly disagreeing with/ challenging statements made by another participant (I)	PI	'While I agree somewhat with participant 3, I think that some students at lower levels may become too frustrated with trying to learn the language when a teacher uses only French.'
	Introducing new perspectives (N)	PN	'I think an important issue that has not been explored yet is... addressed just yet is.'

Table 1: Continued

General processes	*Specific indicators*	*Code*	*Examples of indicators*
	Coordinating perspectives (C)	PC	'Thus far, most of the focus has been on oral French use by teachers and students in a language arts setting.'
	Sharing information and resources (I)	CI	'The URL for this site is.'
Co-constructing shared perspectives and meanings (C)	Asking for clarification/ elaboration (A)	CA	'Do you really think it will be that easy?'
	Posing rhetorical questions (Q)	CQ	'This would create a very difficult problem for the teachers. How do you keep your students interested and motivated to do well?'
	Soliciting feedback (F)	CF	'I was wondering if anyone has any suggestions for going about this?'
	Provoking thought and discussion (P)	CP	'When it comes to the French language, should we only produce students with a very strong understanding? What is important here?'
	Responding to questions (R)	CR	'I have a suggestion for creating a warm, comfortable atmosphere.'
	Sharing advice (S)	CS	'Aim to speak solely in French by the end of the semester.'
Building shared goals and purposes (B)	Proposing a shared goal or purpose (P)	BP	'I wonder if we could design a real gap activity in which even the teacher doesn't know the answer?'
	Working together towards a shared goal (W)	BW	No examples found in the OAD
Producing shared artefacts (A)	Document or other artefact produced by group members working together (D)	AD	No examples found in the OAD

Table 2: Application of the instrument for analysis of the SPICE OAD

Social presence (S)		*Articulating individual perspectives (I)*		*Accommodating or reflecting the perspectives of others (P)*		*Co-constructing shared perspectives and meanings (C)*		*Building shared goals and purposes (B)*		*Producing shared artefacts (A)*	
P	31	O	69			I	3	P	1	D	0
R	16	S	13			A	8	W	0		
C	6			D	1	Q	9				
F	7			I	10	F	8				
G	9			N	2	P	1				
M	10			C	4	R	3				
						S	7				

of any attempt at *Building shared goals and purposes*, and no messages showed evidence of *Producing shared artefacts*.

Thirty-one messages in the OAD were coded *Social presence: sharing personal information* (SP). The frequency of this indicator is likely due to the fact that the module required all participants to post a personal introduction. These introductory posts accounted for 11 of the 31 messages in which the code SP was found. The remaining 20 were messages in which participants illustrated a comment with examples drawn from their personal experience. Similarly, there were 16 messages coded as *Social presence: recognising group presence* (SR). Again, 11 of these were the introductory messages, since greetings such as 'Hello' and 'Hi everyone!' were coded as SR. All participants began their introductory message with some such statement of greeting.

The process/indicator which occurred in the greatest number of messages was *Articulating individual perspectives: statement of personal opinion or beliefs making no reference to perspectives of others* (IO), which occurred in 69 of the 103 messages. Thus, in two-thirds of all messages, participants posted their own perspectives on the problem. However, in many cases, they did not show evidence of accommodating or reflecting the perspectives of others. Thirty messages in the OAD contained no code other than IO. The fact that such a large proportion of postings articulated individual perspectives is congruent with Henri's (1995) finding that many participants in OADs are engaged in monologues rather than in genuine interaction. Henri found in her analysis of an OAD that the 'learners presented their view of the problem... without reference to the solutions offered by their colleagues. The teleconferences read like a series of distinct presentations on the same subject' (157).

Of those messages that did move beyond simple interaction to further collaborative processes such as *Co-constructing shared perspectives and meanings*, many involved asking

questions. The instrument distinguishes between several different types of questioning in an OAD: rhetorical questions, questions asking participants to elaborate or explain, requests for feedback on what the participant has just posted, and questions designed to provoke thought and discussion. However, only two responses were coded as CR, *Co-constructing shared perspectives and meanings: responding to questions*. These were the only two instances in which a participant directly responded to a question raised by another participant.

If the essence of collaboration is that it is a purposive relationship in which participants build something together (Schrage, 1995), then the fact that only one message in the SPICE OAD was coded as *Building shared goals and purposes* and none were coded as *Producing shared artefacts* suggests that collaboration, in its fullest sense, did not occur in this OAD. The one message that was coded as *Building shared goals and purposes* contained a participant's suggestion for a possible activity on which participants might work together ('I wonder if we could design a real gap activity in which even the teacher doesn't know the answer?'). However, no one pursued this suggestion further, and it was not clear from the context whether the participant who made the comment intended it to be hypothetical or an actual suggestion for group activity.

In this sense, the findings from the SPICE OAD are similar to the conclusions reached by Murphy and Laferrière (2001) in their analysis of two OADs using the TORI model of group development. In that study, the groups moved through *Trust formation* and *Open communication* towards *Realisation of goals*, but did not progress to the final stage of *Interinfluence*. Both the TORI study and Henri's (1995) study of interactivity are congruent with the findings of the analysis of the SPICE OAD in that discussants in these OADs engaged in processes that were more individual than group-oriented.

The lowest number of responses was recorded at the highest-level collaborative processes: *Building shared goals and purposes* and *Producing shared artefacts*. This result suggests that in order for the highest-level collaborative processes to occur within an OAD, there must be explicit strategies or techniques aimed at promoting these processes. Furthermore, given the results of this study where there was a clear intent to promote collaboration, along with the results of Henri's (1995) and Murphy and Laferrière's (2001) studies, we can hypothesise that participation in OADs tends towards individual as opposed to group or collaborative efforts. Promoting collaboration in an OAD may therefore require approaches that counter a tendency towards individual efforts.

Conclusions

The purpose of this paper is to report on a study involving the identification and measurement of collaboration in an online asynchronous discussion (OAD). A conceptual framework served for the development of a model which conceptualises collaboration on a continuum of processes that move from social presence to production of an artefact. From this model, a preliminary instrument with six processes was developed. Through application of the instrument to an OAD, the instrument was further devel-

oped with indicators added for each process. The instrument was subsequently used to analyse the SPICE OAD for evidence of collaboration.

Use of the instrument to analyse collaborative processes in the SPICE OAD showed that the instrument can effectively be used to gain insight into the collaborative processes in which discussants in an OAD do or do not engage. Use of the instrument and the model in other contexts would test and potentially strengthen their reliability as well as their usefulness and value in the analysis of OADs. Models and instruments can serve to recognise collaboration. This recognition is a prerequisite to being able to promote collaboration in contexts of OADs. Recognition of collaboration in the context of an OAD involves identifying instances and manifestations of a range of processes along this continuum ranging from social presence to the production of a shared artefact. Recognition also involves identification of individual indicators of these processes ranging from sharing personal information to sharing goals and purposes.

The analysis of the SPICE OAD revealed that participants engaged primarily in the processes related to social presence and articulating individual perspectives. There are potentially a number of factors which may explain why participants did not reach the stages of *Building shared goals and purposes* and *Producing shared artefacts*. These factors could relate to the composition of the group or to the time period and context in which participants were engaged in the discussion. The design of the study did not allow the researcher to investigate these factors. However, it appears that while the design of the OAD itself promoted and supported collaboration, the higher-level processes would need to be more explicitly and effectively promoted in order to counteract a tendency on the part of participants to remain at the level of individual rather than group or collaborative effort.

Promoting collaboration in the context of an OAD can be facilitated by conceptualising collaboration in terms of processes and their indicators along a continuum. Participants in a discussion, the aim of which is to promote collaboration, can benefit from supports and scaffolds that guide them along the continuum through these processes. Promoting collaboration can also be facilitated by determining ways in which individuals can share goals and purposes and finally create or produce a tangible artefact or even an intangible one, such as a solution to a problem. Finally, promoting collaboration in an OAD will necessarily involve an appreciation for the context in which individuals interact in virtual environments. In these environments, individuals interact without sharing spatial or temporal presence. Producing a shared artefact and even sharing goals and purposes represent processes that may occur and manifest themselves differently in an online environment than in one in which individuals interact in real time and in each others' physical presence.

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References

Alexander G (1992) Designing human interfaces for collaborative learning *in* Kaye A R (ed) *Collaborative learning through computer conferencing: the Najaden papers* Springer-Verlag, New York, 201–210.

Brown A L and Palincsar A (1989) Guided, cooperative learning and individual knowledge acquisition *in* Resnick L B (ed) *Knowing, learning and instruction: essays in honor of Robert Glaser* Lawrence Erlbaum Associates, Hillsdale, N.J., 393–451.

Garrison D R, Anderson T and Archer W (2000) Critical inquiry in a text-based environment: computer conferencing in higher education *Internet and Higher Education* **11**, 2, 1–14.

Henri F (1992) Computer conferencing and content analysis *in* Kaye A R (ed) *Collaborative learning through computer conferencing* Springer-Verlag, Berlin, 117–136.

Henri F (1995) Distance learning and computer-mediated communication: interactive, quasi-interactive or monologue? *in* O'Malley C (ed) *Computer supported collaborative learning* Springer-Verlag, Berlin, 145–164.

Jonassen D, Mayes T and McAleese R (1993) A manifesto for a constructivist approach to uses of technology in higher education *in* Duffy T, Lowyck J and Jonassen D (eds) *Designing environments for constructive learning* Springer-Verlag, Berlin, 231–247.

Kaye A R (1992) Learning together apart *in* Kaye A R (ed) *Collaborative learning through computer conferencing* Springer-Verlag, Berlin, 1–24.

Knuth B A and Cunningham D J (1993) Tools for constructivism *in* Duffy T, Lowyck J and Jonassen D (eds) *Designing environments for constructive learning* Springer-Verlag, Berlin, 164–188.

Murphy E (2000) *SPICE: Solving Problems in Collaborative Environments* Unpublished web-based learning module, Memorial University of Newfoundland, St. John's, Canada.

Murphy E and Laferrière T (2001) *Identifying and facilitating group-development processes in virtual communities of teacher-learners* Poster presented at Telelearning 2001, Vancouver, Canada. Retrieved online 29/03/04 at: http://www.ucs.mun.ca/~emurphy/poster.pdf

O'Malley C (1995) Designing computer support for collaborative learning *in* O'Malley C (ed) *Computer supported collaborative learning* Springer-Verlag, Berlin, 282–297.

Roschelle J and Teasley S D (1995) The construction of shared knowledge in collaborative problem solving *in* O'Malley C (ed) *Computer supported collaborative learning* Springer-Verlag, Berlin, 69–97.

Schrage M (1995) *No more teams! Mastering the dynamics of creative collaboration* Doubleday, New York.

Steeples C, Goodyear P and Mellar H (1994) Flexible learning in higher education: the use of computer-mediated communications *Computers in Education* **22**, 1/2, 83–90.