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INITIAL COMMUNICATING STYLES AND THEIR IMPACT ON FURTHER INTERACTIONS IN COMPUTER CONFERENCES

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Abstract

Educators are constantly seeking ways of utilising Internet technologies to enhance the learning of their students. Computer conferences provide a medium in which students have opportunity to discuss and engage with topics while constructing meaning through interaction with their peers. This paper examines the discourse arising from discussion of four topics, in an on-campus, first year, teacher education course, for evidence of cognition and metacognition. A number of factors are identified as having impeded cognition development. Different communicating styles are also noted between the two groups and its subsequent impact on group interactions. Initial postings to the computer conference appear to model successive communication within the group. The messaging behaviour of the students is analysed in the hope of providing further insight into the significance of the first postings to a conference.

Keywords

Interaction, communication styles, messaging behaviour, collaboration.

Introduction

As educators we are continually seeking ways in which we can enhance our courses to ensure that quality learning is occurring. Educators have recognised the value of evolving technologies for effective teaching and learning. Computer conferencing is one such technology that is able to extend the learning beyond the classroom and encourage student reflectivity with the course content. A vast quantity of discourse can accumulate from required participation in computer conferences presenting a challenge to any educator to analyse and assess their value. Effective learning cannot be guaranteed by the quantity of the interactions (Sims, 1998). Analysis of the discourse, communication styles and messaging patterns are needed to address questions relating to the quality of interactions and the students' learning experiences.

Numerous studies (Hiltz, 1998; Anderson et. al., 2001; O'Reilly & Newton, 2002) have helped to inform us about factors that influence effective online teaching and learning environments. Interaction, collaboration, social presence, teaching presence and assessment have been recognised as important components of such environments. There has been much written about interaction, although the connection between learning and interactivity is still not fully understood (Roberts, 2002). Interactivity which must be an intentional part of the design is considered critical in promoting active learning through frequent exchange and reflectivity. The level of interactivity will impact on the degree of student engagement with the content. The term 'interaction' has been defined from many perspectives, influenced by numerous factors such as type of technology used, anticipated learning outcomes, instructor involvement and task design. In their model of Technology-Mediated Interaction, Geer & Barnes (2001) provide a framework for characterising learning outcomes against levels of interaction through the use of Internet technologies. The model in the shape of a pyramid suggests that the higher the intensity of the interaction (collaboration), the greater the quality and frequency of interaction and the higher the

learning outcomes that will be achieved. Sims (1997) prefers to consider interactivity in terms of levels that "facilitate the acquisition of knowledge or development of new skills and understanding", while Gunawardena et. al. (1997) see interaction as "the process through which negotiation of meaning and co-creation of knowledge occurred".

In collaborative learning communities, students are actively engaged in supporting each other in the development of higher level reasoning strategies, critical thinking, hypothesis formation and reflection. Computer technologies are used to support collaborative and discursive interaction, and build relationships by providing the opportunity to connect and engage learners from many diverse backgrounds. A number of theoretical perspectives, with their foundations in cognitive developmental, behavioural and social interdependence theories (Johnson & Johnson, 1996) are guiding the design of courses and our understanding of how students learn. Kearsley & Schneiderman's (1998) engagement theory suggests that learners must be engaged in meaningful tasks for effective learning to occur. The theory identifies three main characteristics: collaboration, problem based and authenticity, which are based around major themes in learning theory (Kearsley, 2000).

Assessment has also been recognised as supporting a constructivist approach while ensuring some level of activity in computer conferencing. Morgan, (1993) stresses the importance of course design and assessment in encouraging a deep approach to learning. In the current case study, educators recognise the value of assessment and have made contributions to various discussion topics a mandatory requirement of the course. It is recognised that students will work for grades so that by requiring responses, students are being forced to engage in learning activities which will provide them with the opportunity to build on their existing knowledge and experiences.

Purpose of Study

A first year, on-campus, undergraduate, teacher education course, *Becoming Information Literate*, has taken into account in its design the factors that influence online teaching and learning environments. With the constant pressures from universities to achieve quality learning outcomes and the ever diminishing human resources it is felt that establishing computer conferences as an integral part of the course will provide students with the opportunity for a richer and more active engagement with the course content. Such conference groups provide opportunity for students to research authentic and relevant topics relating to the use of computer technologies in the classroom. This course is deemed suitable for an analysis of interactions that took place in computer conferences as it encourages on-campus students to further engage with the course content outside of the face to face workshops. Responses to discussion topics are mandatory and small group collaboration around the topic is an assessment requirement. The purpose of this study is to examine whether the use of computer conferences has enhanced the development of cognition and metacognition in students. Arising from the discourse analysis, factors that impact on the significance of computer conferencing will be investigated.

Analysis Instrument

With the recognition of lifelong learning there is a greater emphasis on the development of cognitive and metacognitive skills. Interaction and collaboration can help support the development of such skills. Extensive research in the past decade has shown the capacity of computer conferencing to engender quality learning (Henri, 1992; Newman et. al., 1997; Gunawardena et. al., 1997). The focus of these studies has been to derive instruments of analysis that can be applied to the content of textual discourse and interaction patterns to identify indicators of cognitive and metacognitive learning that would show that quality learning had occurred. Henri (1992) proposed a method of discourse analysis which involved dissecting the message into 'units of meaning' and then classifying these according to their content. She devised five dimensions for evaluation: participative, social, interactive, cognitive and metacognitive. Garrison's (1992) critical thinking stages can be closely aligned to the critical reasoning skills that Henri saw as important in cognitive dimensions in computer conferencing. Gunawardena et. al. (1997) found that these models were useful starting points although they felt they were not specific enough to evaluate

the process of knowledge construction that had occurred through the interactions. Various adaptations have been made to Henri's theory of critical reasoning skills, the set of interactive behaviours based on Gunawardena's Interaction Analysis Model, the interaction patterns identified by Johnson & Johnson (1996), the model developed by Sringam & Geer (2000), and further added to by Geer & Barnes (2001). The adapted analysis model by Geer & Barnes (2001) will be used in the discourse analysis of this case study as outlined in Table 1 to provide insight into the type of interaction and levels of cognition that have occurred, mapped against a schema of indicators relevant to quality learning.

Method

The 226 students enrolled in *Becoming Information Literate* were divided into twelve tutorial groups with each group being assigned to a different computer conference (BIL01, BIL02, BIL03 etc.). Although the contributions to the conference were not assessed, students were required to research the four topics posted throughout the semester and submit a 300-400 word response to each topic over the prescribed weeks. Students were encouraged to not only post their own response but to read the responses of their peers and interact with them. From each conferencing group, four to five students were assigned to a smaller group whose responsibility it was to encourage interaction, summarise the electronic discussion and present the findings in a face to face presentation. It was hoped that the use of the computer conference would help students to reflect on their own understanding as well as benefit from the understanding and knowledge of their peers (Lea, 2001). Although there was some flexibility in the timing of contributions, the restriction within the course design meant that responses had to be made in line with the face to face presentations rather than in terms of their own learning development cycle.

A naturalistic approach of an average higher education learning environment was adopted for the collection of data where communication tools were used in a fairly typical way. Teaching presence was recognised as an important ingredient in effective learning environments and although the intention of educators was to be actively involved, in reality this proved difficult. Due to the difficulty in monitoring a number of computer conferences across a number of courses as well as other teaching commitments there was limited interaction by staff in the online environment. Discussion and support came from educators in the face to face workshops. Hence the interaction in the conferencing groups were student initiated, being led by the small groups. In the first week of the course students familiarised themselves with their conference group and then had opportunity to use the medium and introduce themselves to their peers, so as to establish an environment in which they could feel comfortable.

The textual discourse derived from two of twelve tutorial groups across four topics was analysed for the quality of interaction, engagement with the content and the subsequent messaging behaviour of the students. The majority of students had used email before but few students had had experience with computer conferencing. Being first year undergraduates, the majority of students were directly out of high school, and had had limited experience in working collaboratively to construct meaning. Prior experience with email had tended to be instructionally or socially based. Educators in the course actively encouraged the smaller groups to take responsibility for the discussion and promote interaction around the various topics. It proved extremely difficult to encourage peer to peer interactions even with encouragement and support from educators.

Results and Discussion

Two conferencing groups, BIL04 and BIL07, with 17 and 18 students respectively were selected at random. The discourse over the four topics was analysed using a Schema for Social Behaviour, Cognitive Development and Interactive Analysis as utilised by Geer & Barnes (2001) in Table 1. During the process of analysis two very different styles of interaction emerged. The initial pattern of interaction set during the discussion of the first topic was maintained in subsequent interactions. Both tutorial groups had been provided with the same information and structure while the small groups had also been given the same set of criteria for involvement in the topic discussion. The difference appears to lie in how these small groups managed or initiated discussion, suggesting that student characteristics were an important factor.

Schema for Social Behaviour, Cognitive Development and Interactive Analysis with frequency results of indicators in the discourse

S. Participation and social behaviour	**Bil04** T1	T2	T3	T4	**Total**	**Bil07** T1	T2	T3	T4	**Total**
S1 Individual disclosure										
S1-a Basic introduction.	3		4	4	**11**	17	12	13	8	**50**
S1-b Extended revelation								3		**3**
S1-c Self evaluation										
S2 Social behaviour										
S2-a Courtesy	2				**2**	3				**3**
S2-b Level of dominance/authority										
S2-c Seeking help								5	1	**6**
S2-d Willingness to initiate						1				**1**
S3 Mutual Consideration										
S3-a Identifying mutual interest						1				**1**
S3-b Willingness to exchange	1				**1**	12	9		13	**44**
S3-c Valuing others' views						2	2	3	1	**8**
I. Cognitive behaviour analysis at individual level:										
I1 Elementary clarification										
I1-a Observing/studying a problem	23	18	19	25	**85**		4		4	**8**
I1-b Identifying its elements	17	29	29	16	**91**	3	1	1	1	**6**
I1-c Observing/studying their linkages	12	16	2	12	**42**		2			**2**
I1-d Making assumptions	2			1	**3**	1				**1**
I2 In-depth clarification										
I2-a Analysing a problem	32	49	22	15	**118**	6	16	3	6	**31**
I2-b Identifying assumptions	6	5		3	**14**	2				**2**
I2-c Establishing referential criteria	5	1			**6**					
I2-d Seeking out specialized information	1	2			**3**					
I3 Synthesis and application										
I3-a Drawing primary conclusions	7	5	4	3	**19**	3	2			**5**
I3-b Proposing an idea based on links and relevant information	8	1			**9**					
I3-c Value judgment on relevant solutions	6	2			**8**					
I3-d Making final decisions and deciding on the action(s) to be taken										
G. Interactive behaviour analysis at group level:										
G1 Planning										
G1-a Organizing work/planning group work/setting shared tasks	1				**1**				1	**1**
G1-b Initiating activities/setting up activities for group work			1	1	**2**	3		1	1	**5**

G2 Sharing/comparing/contributing of information										
G2-a Defining and identifying a problem						24	18	14	8	**64**
G2-b Stating opinions regarding the problem	2		2		**4**	20	9	4	2	**35**
G2-c Asking and answering questions to clarify details of statements	3		6	9	**18**	8		11	3	**22**
G2-d Sharing and exchanging knowledge, resources and information	2				**2**	8	5	10	3	**26**
G2-e Corroborating examples provided by one or more participants						1	1	1	3	**6**
G2-f Challenging others to engage in group discussion	2				**2**	9			1	**10**
G2-g Help and feedback giving										
G3 Inconsistency of ideas, concepts or statements										
G3-a Identifying and stating areas of disagreement										
G3-b Asking and answering questions to clarify the source and extend of disagreement										
G3-c Restating the participants' position and advancing arguments or considerations supported by references							2	2		**4**
G4 Negotiation of meaning/co-construction of knowledge										
G4-a Negotiating or clarifying the meaning of terms, areas of agreement and disagreement										
G4-b Proposing new statements embodying compromise and co-construction										
G4-c Integrating or accommodating metaphors or analogies										
G5 Testing and modification of proposed synthesis or co-construction of knowledge										
G5-a Testing against existing knowledge and information										
G5-b Testing against personal experience										
G5-c Testing against formal data collected										
G6 Agreement statement(s) and application of newly constructed knowledge										
G6-a Summarization of agreement(s)										
G6-b Application of new knowledge										

Table 1: The frequency of results of indicators in the discourse

The introductory messages as well as messages less than 10 words were not analysed. On a number of occasions during the small group face to face presentations the conferences were used for group activities. These interactions were also discounted from the analysis. Overall 136 and 139 messages were generated in BIL04 and BIL07 respectively, but only 97 and 79 messages respectively were analysed using the Schema. The unit of analysis tended to be the paragraph although it was recognised that students were not always accurate with the structuring of their ideas. There appeared to be too much variation in cognition in a posting to use that as a single unit for analysis.

Discourse Analysis

Table 1 shows a schema of indicators relevant to learning, based on the work of Gunawardena et. el. (1997) and Henri (1992) and the instances of occurrences in the aggregated discourse generated by the two groups over the four topics (T1, T2, T3, T4). Table 1 shows that the perceived subject for discussion in BIL04 was the individual while in BIL07 it was the group. Social exchanges in BIL07 set the tone for the type of interaction and discussion that occurred. There was a considerably higher acknowledgement of others being part of the discussion in BIL07 which was most commonly recognised by a greeting to all conference members at the beginning of the response. In BIL07 the first message came from the small group who identified themselves and asked that the group help them with information for their group presentation by contributing their understanding of the topic based on their own reading. This first message proved the catalyst for the style adopted in subsequent responses where the presence of conference members was acknowledged with the hope that their response might help the small group: *"Hope this is of some help to the group...once again good luck with it"*

This feeling of community was reflected in the majority of the responses. The initial communicating style adopted by the small group for the first topic set the pattern for future topic discussions. In each instance the small group took the initiative inviting the others to reflect either on specific questions designed by them around the topic or to respond to the topic as stated. BIL07 tended to incorporate a sense of community into their responses. Their discussion of the topic resulted in some cognition through an explanation of the problem, providing their opinions, sharing resources and knowledge and at times asking or answering questions. Students failed to engage in the deeper approaches to learning at the group level (G3, G4, G5, G6). As first year undergraduates, student-led groups lacked experience in scaffolding, guiding and constructing their knowledge. They would also have had little understanding or experience of what it means to negotiate meaning and co-construct knowledge in the online environment. As their contributions were not assessed and the only requirement was a 300-400 word response, there was little incentive to delve deeper into the topic. Lecturer intervention as well as assessment of the actual contributions may provide the encouragement, direction and guidance needed to attain the higher levels of reasoning and critical thinking in their interactions.

On the other hand students in BIL04 reacted as individuals providing their own detailed response to the topic devoid of the sense of being a group. There was little acknowledgement of others in the conference group except when the small group challenged or invited discussion at the end of the conferencing period for each topic. This pattern of communication was then modelled by the other small groups for their discussion topic and presentation preparation. The discussion in BIL04 showed some shift from the more surface level discussion of the topic to a greater exploration and clarification of what the topic implied. Students showed that they had done more than just reiterate what they had researched but they were also thinking more critically about the problem and its impact in the classroom. However there were only a few occurrences where students attempted to draw conclusions and suggest possible solutions. As was the case with BIL07, there was no incentive for students to delve deeper into the topic beyond providing their response to the topic. Any synthesis and application that occurred around the topic tended to be addressed in the face to face presentations by the small groups. BIL07 emerged as a supportive online learning community while the other group (BIL04) although contributing relatively detailed responses, showed little sign of collegiality and support.

Validation of Analysis Instrument

This instrument had been tested and proved to be valid against another course. However for the analysis of the discourse from this course, some difficulties of implementation were experienced. The indicators of

the instrument were generic in nature and designed to be independent of topic, but when these indicators were interpreted in terms of specific topics they were not always adequately distinguishable. The subtle differences in I1a, I1b & I2a were not always evident as the topics tended to be more closed in the cognitive sense. The development of "semantics" around the various indicators may prove more useful for future analysis of such defined topics. The other complexity experienced was at the group level where there did not seem to be the same gradation of indicators in the levels of cognition as identified at the individual level. There were many instances where the students tended to be merely defining or studying the problem, but there were also many occurrences where they were actually grappling with and analysing the problem, but not necessarily at the level of advancing arguments that were supported by references (G3c). Both types of discussion were not distinguished as at the individual level and fell under G2a. The instrument showed validity, but some adjustments based on the task type, such as use of semantics, may be needed. This further highlighted the difficulties experienced by educators who rarely have time for detailed analysis, let alone development of semantics. Student characteristics and group dynamics have obviously impacted on the type of interaction and subsequent cognition. We are left to wonder whether there is a quick and efficient instrument that can account for all these factors and yet indicate improvements in learning through the use of computer conferences.

Computer conferences versus face to face

The question begs that in an on-campus course are not face to face discussions still the most beneficial and preferred option? The factors impacting on effective teaching and learning are just as readily available in face to face classes. Does computer conferencing have any advantages over face to face discussions? One of the intentions in *Becoming Information Literate* was to encourage extended engagement with the course content outside of the class, while at the same time giving students time for reflection and the opportunity to respond when it suited. It also gave the shy student the chance to articulate their understanding of the topic. As the responses were available to all members in the conference it was felt that this added pressure would ensure that students researched more widely and prepared themselves more adequately. Substantial responses that showed clear articulation were expected, thus necessitating a certain level of engagement which may not be the case in face to face discussions where a student may respond with a few and possibly disjointed sentences. Although the verbal cues and the opportunity for an instant response and reaction were missing, computer conferencing provided a permanent record of the discussion which could be referred to at a later date. Such record of discussion would not be available from a face to face discussion. This proved very useful in this course as students had the chance to review the discussion in preparation for their examination. It also extended their experiences with communication in the online environment. It was hoped that it would further develop their skills of collaboration and support, however this was not evident and more work by educators would be needed in this area. Being first year undergraduate students would also account for lack of experience and understanding of how to work successfully as a group online. Students find collaborative tasks difficult and challenging in face to face exchanges, let alone working in an online environment. At best most tasks are accomplished at a cooperative rather than a collaborative level.

Messaging Behaviour

In order to provide further insight into why two groups starting from the same premise, behaved very differently in their interactions, the messaging behaviour of the students was investigated in relation to their use of email. Both groups showed a peak in their activity around the time the tutorial responses were due in Weeks 3, 6, 9 and 12 which would be expected. Just below 60% of the messages posted for BIL04 and BIL07were submitted on a Monday and Tuesday respectively, the day of their face to face workshops. Similar patterns for exchanges across the weeks of the semester were shown in both groups. Only 14 of the 106 messages submitted were outside the 8.30am-5pm timeslot for BIL04, while BIL07 had a reasonable spread across the day from 7am to midnight, with a peak around the middle of the day and two messages being posted in the early hours of the morning. For BIL04 the average number of words per message was 281, while for BIL07 it was 247. Such behavioural patterns failed to provide any precise evidence as to why the two groups interacted so differently in their groups.

Student Characteristics

From the statistical data gathered about the students, the two groups varied considerably in their composition. In BIL04 about 1/3 were males (6 males, 11 females), while in BIL07 about 1/2 were males (9 males, 9 females). The age variance in the groups was considerably different. BIL04 had an age mean = 19.6 (Standard deviation = 2.11) while BIL07 had an age mean =21.1 (Standard deviation = 4.71). Greater maturity and experience could possibly be a contributor to the higher group interactivity. Other differences noted were that the average exam mark for BIL04 was 62% and for BIL07 68.6% while the final grade for the course being 61.7% and 69.1% respectively. Although there were differences in group composition and grade achievements, it is difficult to draw any conclusion as to why the groups interacted differently, without further investigation of student characteristics and their approach to learning.

Conclusion

As noted in the discussion there were a number of factors that impeded the development of cognitive and metacognitive learning. However both groups showed an engagement with the topics that would not have been possible or evident in the face to face classes, mainly due to time constraints. There is a need to provide more guidance to students to ensure a richer and more active engagement with the topics. Topic task and design will further impact initial communicating styles and their subsequent interactions. Further investigation of additional computer conferences is needed to understand the extent to which the initial posting of messages might be critical to the overall behaviour and subsequent quality and quantity of the interaction and collaboration in computer conferences. Additional examination of student characteristics and their approaches to learning should be carried out for a greater appreciation of how educators might be able to guide and support the initial conference postings to ensure quality interactions leading to cognitive and metacognitive development in student learning, whether at the individual or group levels.

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