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ABSTRACT

The increasing use of computer technology in formal educational settings has been simultaneous with the increased acceptance of functional perspectives of knowledge construction and acquisition. The practical need to make formal education cost efficient has resulted in the use of computer technology to render knowledge accessible to students who are distant in time and/or space from traditional educational settings. A study analyzed transcripts excerpted from online threaded discussions to identify language content and usage characteristics reflecting knowledge construction occurring between participants, and consequent inferred cognitive change. Specifically, contingency in discourse may be viewed as one such characteristic. An analysis of numerous transcripts of interactions of students participating in online discussions suggests that contingent language use is occurring and can be a useful index for initial conceptual change. For contingent language to occur, a person must first identify his/her social role or status with other participants in the group. The second step is to use linguistic exchange to constrain word meanings, by using other people's words and then adding personal meanings. These steps can be seen occurring in a transcript which captures an online discussion about where deaf individuals can best receive an education. As each participant adds his/her own understanding of the connotation of these words, the other potentially comes to a richer understanding of the whole issue of residential versus non-residential placement for individuals with hearing differences. Those engaged in education need to better understand whether, how, and to what extent learning is taking place through online technology and how to assess it. (Contains 10 references.) (NKA)

COMPUTER MEDIATED LINGUISTIC INTERACTION AS A TOOL FOR THE SOCIAL CONSTRUCTION OF KNOWLEDGE

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Epistemology is a branch of philosophy concerned with the nature of knowledge acquisition. At issue is, what is knowledge and how does one come to know it? A number of paradigms have been developed to address this question. Functionalism originated in the United States in the 1800's. Functionalists proposed the idea that human consciousness and behavior are central to adjusting to the environment. This implies that knowledge acquisition is not mastering static elements of a knowledge domain, but rather is an interactive, dynamic, evolutionary process that is constructed within social exchange. Social interaction further implies reciprocity and bi-directionality between participants (Garton, 1992). This reciprocity is in part coded in linguistic interaction. In this sense, language interaction is a necessary component of cognitive growth, acting as the representational system that mediates in cognitive development (Wertsch, 1996). Lyotard, in his book, The Post-modern Condition: A Report on Knowledge (1984), argues that the past few decades of the 20th Century have increasingly investigated language, linguistic theories, communication, and computer languages consistent with an emphasis on language use as a vehicle of cognitive growth. He proclaimed that technology as a vehicle of language use has a major impact on knowledge acquisition by asserting that no knowledge will survive that cannot be translated into computer language; that the transmission and storage of information will no longer depend on individuals but on computer use, or

technology functioning as a vehicle of linguistic interaction and of knowledge construction (Powell, 1998).

The influence of this philosophical trend in understanding the role of linguistic interaction in how knowledge is constructed and acquired has been reflected in the way in which knowledge is evaluated in formal educational settings. Traditionally, knowledge acquisition has been assessed by inferred mental change as reflected in performance on convergent measures, such as answering a series of questions. In contrast, from a functionalist perspective, knowledge acquisition is based on self-awareness, behaviors that reflect that awareness, and adjustment, or accommodations to the environment. This translates into divergent measures of interaction within a social exchange context wherein knowledge is negotiated and constructed between two or more persons, usually involving language, and often using technology as a vehicle of interaction.

The increasing use of computer technology in formal educational settings has been simultaneous with the increased acceptance of functional perspectives of knowledge construction and acquisition. The practical need to render formal education cost-efficient has resulted in the use of computer technology to render knowledge accessible to students who are distant in time and/or space from the traditional educational setting. On-line classes have been one response to this demand for efficiency. A recent report issued by the U.S. Dept. of Education indicates that there are now over 26,000 Web-based courses available, with estimates of 100 new college courses going online every month. During the current academic year, approximately 2 million people will take online courses (Wagner, 2001). These courses and programs tend to proliferate in colleges of education and the social sciences. The majority of the content of these courses is comprised of written, verbal material wherein students are asked to respond either in real time or delayed time. The increase in use of this means of knowledge access and acquisition, has resulted in a scramble to adequately assess the efficacy and learning outcomes of this approach. Online courses have been appearing so rapidly that the assessment of their effectiveness has not been able to keep pace, and evaluators are "challenged to understand the unique characteristics of the online medium and its social and ecological structure, in order to develop new principles for evaluating learning" (Gunuwardena, Lowe & Carabajal, 2000, p. 1677).

In a review of articles assessing the knowledge outcomes of individuals who participate in this mode of knowledge acquisition, namely on-line delivery and consumption, most do not assess changes in conceptual understanding of

individuals, but rather assess courses and programs through surveys or journal entries reflecting student attitudes and overall satisfaction toward distance learning. That is, if students like the courses, they are deemed efficacious for learning (Gunawardena, et al., 2000; Wagner, 2001). This unitary conclusion based on the assessment data from on-line courses, is predictable, since the whole movement is heavily influenced by functionalism wherein mental changes are not directly or indirectly assessed, but rather, self-awareness, external behaviors, and adaptation to external environmental learning constraints are inferred from language interaction and valued as indices of learning.

In spite of the use of student satisfaction data to declare the success of education delivered using computer technology via on-line courses, some educational researchers are not satisfied that the question, "how well do students learn from courses delivered via on-line means?" is being answered thoroughly. Some are thus looking beyond survey data to discourse analysis to delve deeper into the nature and quality of linguistic interactions between participants. Questions that are often asked from this perspective relate to participation patterns, including numbers of words students utter, the number of conversational turns, and the proportion of student to instructor language. However, while participation analysis techniques can provide information on who participated, how actively, and for how long, they do not give information on the construction of knowledge or the content and quality of learning that is taking place (Gunawardena, Lowe & Anderson, 1997). Thus, there is increasingly a recognized need to assess the uses of language and its content in on-line linguistic exchanges, rather than counting student utterances as reflecting participation or meta-analyzing student satisfaction with their classes. Since most on-line classes use "chat rooms" and "threaded discussions" to evoke the participation of students, discourse research on the content of student responses primarily uses these types of written, verbal exchanges as the basis of analysis (Gunawardena, Lowe and Carabajal, 2000). If education continues to embrace computer technology and on-line delivery, it is increasingly important to employ methods to assess student learning that go beyond superficial indicators.

The current study sought to analyze transcripts excerpted from on-line threaded discussions to identify language content and usage characteristics reflecting knowledge construction occurring between participants, and consequent inferred cognitive change. Specifically, contingency in discourse may be viewed as one such characteristic. McTear (1981) and others (Krupa-Kwiatkowski, 1998; Perinat and Sadjurni, 1999) refer to contingency as the act of one participant taking the words or actions of another participant and wrapping their own words

or meanings around received words or meanings so as to negotiate a common meaning. As applied to learning via on-line course delivery, at issue is whether one can identify this process during written, on-line discussions and whether or not one can use this characteristic of the discourse as one way to assess the learning, conceptual change, or knowledge acquisition between students that is or is not taking place, and to what extent it is occurring.

An analysis of numerous transcripts of interactions of students participating in on-line discussions suggests that contingent language use is occurring and can be a useful index for initial conceptual change. In order for contingent language to occur at all, a person must first identify his/her social role or status with other participants in the group. One can see this occurring in the following transcript as Jane establishes her social role in the conversation, and others establish their status.

> Comments in the following on-line discussion are prompted by the question: Where and how are most children who are deaf or hard-of-hearing served? Who decides what the least restrictive environment is for students who are deaf or hard-of-hearing?
>
> After a student named Jane contributes 200 words, several students respond briefly (an average of 10 words) with utterances that give her "expert status" in terms of her social function within the exchange. Utterances include, " Wow, Jane, you really know your stuff! I'm really impressed with your comments! The information you gave us was so interesting. Jane, what an interesting education you are giving us, and I'm sure you are admired by many. Thank you for the good information about some of the issues in deaf education. I don't think you rambled on at all. I think you are right about people and other exceptionalities. I agree with Jane. Jane, you made a strong case."

After the social roles and status of the participants are established, the second step is to use linguistic exchange to constrain word meanings, by using other people's words and then adding personal meanings to those words as the conversational turn is handed off to the next participant. One can see these steps occurring in the following transcript which captures an on-line discussion about where deaf individuals can best receive an education. The following exchange suggests two participants struggling to define "sent away" and its implications, so

that they can share meaning and interact jointly around a concept toward mutual conceptual change.

> Student A: Many years ago any child who was deaf was sent away to a school for the deaf. Times have changed, society is more accepting of someone who is deaf and therefore provides educational opportunities for those students within the local educational setting. There is more acceptance of the problem.
>
> Student B: When you said "sent away to a school for the deaf", I don't know that I would use that phrase to describe those educational practices. The DEAF CULTURE is extremely proud of deaf residential schools, and attending a deaf residential school is considered a part of the culture. Maybe from a hearing person's perspective, the schools for the deaf were something to be "sent away to," but many deaf people see those schools as the first place where they actually felt accepted and could communicate with others without being forced to try and "become" one of the hearing people. Not to pick on you but when you said that "there is more acceptance," I would also not term deafness as a problem. Once again, the deaf culture does not see deafness as a disability they need to overcome, or a barrier in their life. They see it as a defining feature of who they are. The deaf culture is proud of being deaf.
>
> Student A: You need to understand where I am coming from. I have an aunt who is near 50 who is deaf. My grandparents felt she needed to be sent away in order to learn. I am fluent with sign language and would never mean for this to be a put-down. My point of view is somewhat different since I have the background regarding my aunt. Times have changed. there is absolutely nothing wrong with a deaf school and attending one, for that matter. I see deafness as a way of life, just like some people are tall, are overweight, or have a learning disability. I apologize if I have offended you.

Note in the above example how the participants jointly define the implications of the words "sent away" as they apply to individuals with hearing impairments. As each participant adds his or her own understanding of the connotation of these

words, the other potentially comes to a richer understanding of the whole issue of residential versus non-residential placement for individuals with hearing differences. Reviewing a number of transcripts from similar on-line discussions suggests that these two practices of establishing participant's social roles and circumscribing word meanings, are initial steps in conceptual change and lay the ground work for further substantive linguistic interaction. Without these initial steps, words may be exchanged, but mutual communication is limited.

Thus, to the extent that education has come to be viewed as a process of constructing knowledge and that that construction traffics in the company of linguistic exchange, and that technology has become an integral part of the process, as in the use of on-line course delivery and access, it is essential that we who are engaged in the enterprise of education come to better understand whether, how, and to what extent learning is taking place through this medium and how to assess it. Toward this end, the above approach is suggested as a first step in identifying initial indices of conceptual change, hoping that it will lead to a deeper analysis of linguistic interaction as reflecting student learning or the lack thereof.

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