Discourse-based Learning using a Multimedia Discussion Forum

Meng Hong Tay, Chit Meng Hooi, and Yam San Chee
School of Computing, National University of Singapore

Abstract

The rapid growth of the Internet, coupled with improved multimedia capabilities in computing, has expanded the options for using technology to support collaborative learning. Asynchronous electronic conferencing is commonly used to support distributed discourse-based learning. Mind Bridges is a Web-based threaded discussion forum with support for embedded multimedia content. This paper describes the Mind Bridges system as well as an empirical study of its use to support science learning. We monitored the pattern of usage and the trajectory of collaborative discourse manifested by participants. We found a shift in the percentage of shallow comments and learned facts towards independent thinking statements over time. However, improvement in students’ conceptual understanding was hindered by their weak reasoning abilities.

1: Introduction

The convergence of computing, communications, multimedia, and Internet technologies, has expanded the options for using technology to support collaborative learning. In particular, asynchronous electronic conferencing systems are now extensively used to support distributed discourse-based learning. Such systems enable continuous access to active discussion forums that involve participants from all over the world. In addition to user-contributed discussion, such systems also allow the exchange of information and materials, including pictures, movies, and audio clips. Mind Bridges [1] is a threaded discussion forum that was developed to support discourse-based learning with embedded multimedia content. This paper describes the current Web-based version of the Mind Bridges system version 4.5, as well as an empirical study of its use.

1.1: System features

Mind Bridges 4.5 is accessed through a Web browser. Users are presented with a thread and message view on their screen. Mind Bridges utilizes different colors to encode the different depths of reply in a thread. These colors are mapped to the message view and provide users with a sense of the depth of the discussion thread for any particular message.

Users compose messages using a WYSIWYG multimedia editor. The message composer allows the composition of a HTML-based message with no need for HTML tags (see Figure 1). Common HTML authoring features such as bold, italic, and underline text styles are provided. The message composer also allows the insertion of multimedia resources. Multimedia files can be inserted either by selecting from a file-system browser, or by means of drag and drop. Mind Bridges currently supports JPEG and GIF files for images, MPEG and Quicktime MOV files for movies, and MP3 and WAV files for sound. It also supports live video and sound capture. Users equipped with a Web-cam and microphone can insert their recordings directly into a message.

2: Empirical study

We conducted an empirical study to explore the use of Mind Bridges in supporting science learning. We monitored the pattern of usage and the trajectory of collaborative discourse manifested by participants over the duration of the study.

The study was conducted with four students, all aged 16. All four students were male. Our data span a period of twenty-three days. Due to difficulties related to obtaining students, two students joined the discussion from the 13th day. All students were above average in their grades. We chose a discussion topic—elementary genetics—that students could relate to and that was relevant to science.
learning. The intention was to create an environment that would encourage the students to engage in deep, critical thinking about the basis of their being. The discussion topic was called “An onion and you.” Students were asked to explore the differences between an onion and a human being (themselves) with a view to arriving at a scientific explanation of the genetic basis for the human–onion difference. A facilitator was introduced to contribute discussion scaffolding and to guide the discussion as and when necessary.

2.1: Findings

As Steeples & Jones [2] have argued, learning is ultimately aimed at improving the understanding of various phenomena and situations. It is not merely about recalling specific facts or solving specific problems. In order to assess the learning experience of each student, we observed the development of their thinking by evaluating the quality of their message postings. We identified the constituent idea units in each message and categorized each student’s contribution as one of four types: (1) casual statements, (2) shallow comments, (3) learned facts, and (4) independent thinking statements. Casual messages are those revolving around social conversations. Shallow comments cover idea units containing no scientific data and showing no evidence of deep thinking about the topic. These messages are usually based on common observations acquired through everyday life. Learned facts are identified by students making use of scientific terms. For example, use of the word “meiosis” to describe the process of cell division. Independent thinking statements are those that critically question the ideas of others, rebut criticism raised by others, or manifest reflective thinking.

Over the period of the study, we observed some decrease in the percentage of shallow comments posted and a gradual increase of independent thinking messages until day 13, when two new students were introduced into the discussion forum. For a period of two days after this point in time, independent thinking statements were absent (see Figure 2). The students paused to acquaint themselves with one another.

We found that the students experienced difficulty learning about basic genetics. Hence the facilitator provided scaffolding in the form of URL links to relevant articles on the Internet. One student responded favorably to this and attempted to elaborate on the articles to the other participants. Regrettably, we found that, the students had rather weak reasoning abilities. Probing by the facilitator tended to evoke responses that were poorly correlated to the probe questions. Students were directed to the phenomenon of differential rates of DNA loss between humans and onions, but they did not appear able to fully grasp the significance of this idea with respect to its contribution to the genetic difference between onions and humans. The overall quality of the discussion between students left something to be desired. The limited success in terms of conceptual understanding gained was partly counterbalanced by the observed shift from shallow comments and the regurgitation of learned facts to a higher percentage of independent thinking statements. However, the students still have a pressing need to develop their critical thinking skills. We attribute their weak reasoning ability to the school system they are in which does not adequately develop their critical and independent thinking abilities.

Conclusion

Mind Bridges is an asynchronous Web-based threaded discussion forum with support for embedded multimedia elements. It has been designed to facilitate discourse-based learning with rich media representation. Our empirical study revealed an increase in the percentage of independent thinking statements over time. However, acquisition of conceptual understanding was hindered by students’ poor reasoning ability.

References


![Figure 2: Percentage of different idea types contributed over the duration of study](image)