Text Forum Features for Small Group Discussions with Facet-Based Pedagogy

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ABSTRACT

We describe an approach to teaching that engages students in small-group discussions of conceptual material. Then we describe software that mediates the discussions with an online textual newsgroup-like system that has special features to support a pedagogical approach that deals explicitly with student preconceptions. Our system, called INFACT-FORUM, is part of a larger CSCL system called INFACT that supports student discussion, computer-assisted assessment, display of student progress data, and support for pedagogical intervention.

Keywords

facet, misconception, learning, collaborative, software, CSCL, assessment, text, conferencing, group discussion, mark-up, annotation, visibility, hide, concept, newsgroup, writing, pedagogy.

INTRODUCTION

In a recent report recommending methods for improving student learning (NRC 1999), recognizing student preconceptions and using them to engage the students is given a high priority. A particular methodology for discovering and working from students' preconceptions is sometimes called "facets" of understanding. A facet is a particular conception, often naïve or limited in its consideration of the relevant factors or phenomena, and it can be considered as an approximate understanding of some concept (Minstrell, 1992). The question arises as to how best to diagnose student facets. One method is to use a series of questions with multiple-choice answers. The DIAGNOSER project takes this approach (Hunt and Minstrell, 1994). It has the advantage that questions can be designed to get directly at student facets within a relatively short time. Furthermore, the reliability of the diagnoses can be high. One drawback of the multiple-choice approach, however, is that some students do not like the traditional, test-like format. Furthermore, students are not involved in collaborative learning (see, e.g., Scardamalia and Bereiter, 1996) while they are responding to the questions. An alternative approach to eliciting and diagnosing facets involves the students in focused, small-group discussions, and uses their expressions in that context as the basis for diagnosis.

THE INFACT TEACHING CYCLE

In Figure 1 is shown a process diagram of the teaching cycle when using the INFACT approach. The first event in the cycle is the posting, by the instructor, of a challenge question for consideration by the students. Students are given approximately 24 hours to make individual responses to the question. These responses are only visible to the instructor(s) and their authors until the "curtain" is raised to make them visible within their particular groups. Group discussion proceeds until day 5, when each group is required to post a consensus answer to the original challenge with either an agreed upon single answer or a synthesis of remaining differences. Diagnosis by the instructor(s) can begin as soon as individual posts are available, and continues until enough assessment data is available upon which to safely base interventions appropriate to each student. The diagnosis process itself may be interactive, if the teacher chooses, so that the teacher may request clarification from a student before entering a facet diagnosis in the database. The teacher may also wish to email each student as a method of acknowledgement of the student's efforts in the discussion. The email message itself could contain suggestions for the individual student. The next step in the general process is for the teacher to identify general trends in the groups or class as a whole by requesting visualizations of the facet assessment data just collected. These trends would typically suggest particular teaching interventions to an experienced instructor. The instructor then implements the interventions, which might consist of any of the following: joining in on group discussions and posting suggestions or leading questions; offering a link to some web-based resource; or making adjustments to the memberships of the groups.
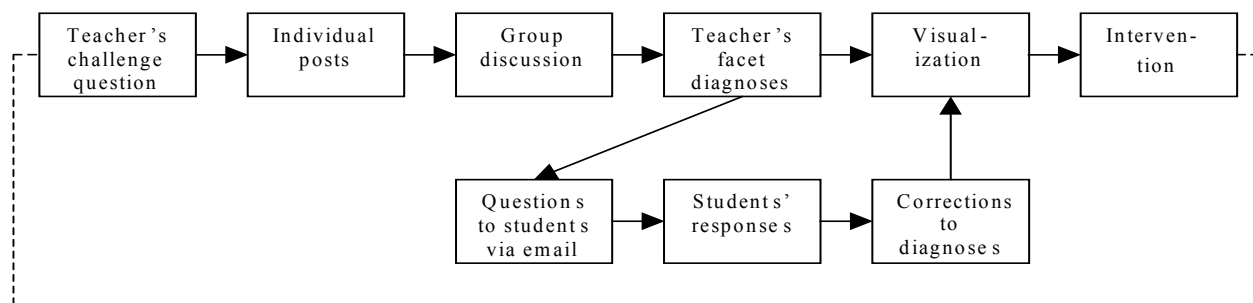
Figure 1. The INFACT pedagogical cycle. The period of the cycle is normally 1 week.

If additional time is available, there could be additional subcycles of group discussion, diagnosis, and intervention. However, in practice, there is seldom time for much iteration on that level.

The INFACT approach to assessment poses several challenges not faced by the multiple-choice questionnaire method of DIAGNOSER. The first of these is the necessity of structuring the small-group discussions so that there is a high probability that students will reveal their facets as they participate. The second of these is the challenge of making accurate diagnoses efficiently from the students' writing. This short paper is concerned primarily with the former and how the software itself can help structure the discussions.

INFACT-FORUM

In order to best support our teaching process, we decided to implement a custom textual conferencing facility. As a part of the INFACT suite of tools (Tanimoto et al, 2000), we call this INFACT-FORUM. Its features can be grouped as follows: (a) user account administration, (b) messaging, (c) visibility control, (d) support for annotation and assessment. Perhaps the most unique features of INFACT-FORUM are its controls, available to administrators, for the visibility of student messages. While it is common in text-conferencing systems to provide moderators with ways to delete or hide offensive or off-topic messages, INFACT-FORUM, as a system to support diagnosis of individual student preconceptions, allows an administrator to make student responses to the teacher's questions hidden from other students, either indefinitely or until a particular time. We refer to this feature as "the curtain," because unhiding a student's message is like raising the curtain on a stage to reveal something anticipated. The teacher raises the curtain to begin the group discussion phase of the cycle. For simply censoring, there is a facility for an administrator to hide a message from all users, without upsetting the thread structure in any way. Keeping the curtain lowered for the first phase of a discussion helps to keep each student's initial response to the challenge question an individual response rather than a response informed by peers. This provides a mechanism by which to engage every student in the discussion by forcing them to commit to an interpretation or possible solution before benefit of group ideas. The possibility of later raising the curtain permits all students to then share their personal views of the challenge without having to retype it or re-express it.

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For a more detailed description of INFACT-FORUM and more references, see the web-based version of this paper.

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