CaseBook: A problem based learning online environment for high school Microbiology

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ABSTRACT

Problem-based learning (PBL) is an educational approach that allows students to improve problem solving and critical thinking skills while learning science. However, PBL requires significant teacher time and expertise to develop problems and facilitate small-group problem-solving sessions. With advances in technology, PBL can be used in today’s classrooms in an effective and scalable manner. CaseBook is an interactive computer system that allows for easy integration of PBL into the K-16 curriculum. Through a simple web-based interface, teachers enter and edit their case materials. As students work through cases, CaseBook guides them through a 3-stage process in which they analyze, learn and reflect. Students may work independently, or a small group of students may work together and share a Team Notebook, which is used to record facts, ideas, and issues about the case as they progress. Students assess their progress through self and group reflection and through teacher feedback.

In this poster, we report on the use of CaseBook for a microbiology case in a high school classroom. The results suggest that CaseBook is effective for both advanced and remedial students. As the technological capacity of students and classrooms increases, it is only appropriate to use this technology to implement novel methods of teaching that will provide students the skills they need post-graduation.

METHODS

The high school trial of Casebook was performed at North Springs High School, located in Fulton County, GA. Students from Global Studies (identified as lower level learners) and Honors Biology were given a case, "Digestive Distress" to work on using the Casebook program, or using a traditional pen and paper format. Each class of students was divided into groups so that both methodologies were running simultaneously. Students were pre-tested before going through the case, and were post-tested using the same test upon completion of the case. "Digestive Distress" followed the story of Shelby, a freshman college student who has watery diarrhea. The students eventually learn that Shelby drank unfiltered stream water while on a biking trip and ultimately conclude the case by studying a particular water-borne pathogen.

RESULTS

Some sample test questions were given to the students. Students in Global Studies and Honors Biology were asked to provide their responses on paper. Each class of students was divided into groups to work together through a web interface that fosters investigative learning. Large classes can be divided into smaller groups of students, making the job of facilitation easier. In all cases, students were able to answer the questions, and improve their research skills and their use of new technology enhanced their learning experience.

Student responses were collected using an online survey tool. The survey tool included questions such as:

1. Did you enjoy working on the Casebook interface? Yes, No, Not sure, Somewhat, Very much
2. Do you think that Casebook is an effective learning tool?
3. What did you like best about Casebook?
4. What did you like least about Casebook?
5. What would you like to see added to the Casebook interface?

Conclusions

1. Preliminary data suggests that both advanced students and lower level learners achieve larger learning gains using Casebook.
2. Students enjoy using the Casebook program, even more than traditional, paper-based cases.

Future Directions

1. Improve Casebook interface: resolve issues involving ease of use, automatic save feature.
2. Test Casebook using other cases at both the high school and college levels.
3. Collect data and publish results showing gains in problem-based learning exercises and general knowledge using Casebook.

References

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