Teacher Survival in a Web-based Constructivist Learning Environment: A Malaysian Experience

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Abstract: Educators are well aware of teacher support as a form of scaffold that helps learners reach their "zone of proximal development" (Vygotsky, 1978). An online case study conducted over 4 weeks in an elementary school in Malaysia showed that teacher support came in six multiple forms. However, the nature of an online constructivist learning environment presents a difficult task for the lone teacher in supporting all students reach their desired learning level. This paper will discuss the need for intelligent agent technology to support the teacher reach his/her 'zone of proximal support'.

Introduction

Much has been discussed and researched on instructional strategies to support learning in an online environment. Among the reasons for creating an online learning environment are the following: meeting the needs of learners of varying abilities and allowing learners to access materials anytime, anywhere (Mathew and Dohery-Poirer, 2000); accommodating learners of different learning styles (Franklin & Peat, 1998); enhancing communication, information retrieval and sharing (Hackbarth, 1997); providing learners the necessary skills in effective use of technology for the workplace (Freeman & Caper, 1998) and providing for active and integrated learning experiences (Susan, 1997). There is also little doubt with regards the ability of the web to enhance higher-order thinking skills and content acquisition (Vullo, 1993, Follansbee, 1996, Abtar, 2001). Online strategies that have supported such efforts include online discussion, collaboration, retrieval of information, quizzes, assessment, didactic teaching & mentoring (Lyons, Hoffman, Krajik & Soloway, 1997; Pitt & Stuckman, 1997; Hewson & Hughes, 1998; Abtar, Sapiyan and Mansor, 1999). Basically it's all about active learning, a phenomena prophesized by Dewey in 1910 and is possible now with the availability of the interactive and open nature of the web. However, how does the teacher fit into such an environment? With so many reasons to incorporate online strategies for better learning, why is it that these strategies are not easily adopted and practiced? Although there is a plethora of strategies and ideas to enhance thinking and learning, implementing them in the classroom is another matter. The reality of the classroom characterized by a web-based constructivist learning environment (WebClen) presents many challenges with regards the role of teacher. The following sections will briefly present an online scenario and suggestions on how the teacher can be supported to allow for easier and better integration of such strategies.

Teacher Role in an Online Learning Environment

An online template incorporating sound pedagogy (Abtar, 2000) was used to create a web-based constructivist learning environment for Year 4-6 students. Posttest scores showed that there was a significant improvement in student higher-order thinking skills and geoscience content acquisition. In such an environment, the teacher played multiple roles that is: a content expert, a technology specialist, a bilingual expert, a motivator, a cooperative and collaborative learning advocate, and a monitor of student progress. As a content expert, the teacher provided support at three levels. This three tiered approach first involved support at a topical level whereby students

were introduced to the topic with the aid of an advanced organizer. An advanced organizer aids in activating students' schema when attention is drawn to the preceding and following topics of study. Second, the teacher zoomed into the content for the week and the teacher's role as an expert involved such skills as probing, clarification, exemplification and use of visual aids. Third, the teacher's focus shifted to the task at hand, whereby she clarified the task by drawing on local content and by modeling the processes students needed to employ in the understanding of concepts. The teacher provided technology support in three areas, namely hardware applications, general software applications and specific software applications. Hardware support included familiarizing students with computers and managing limited hardware resources. General software applications included helping students understand basic web-based concepts such as 'http', 'URL, 'search engine', 'refresh', and managing the MS Windows environment. Specific software applications related to the use of the geoscience web-template included introduction to such terms as 'username', 'password', 'next page', previous page' and use of specific functions such as 'save', 'edit', 'browse' and 'send'. As a bilingual expert, the teacher played a major role in helping students translate information from the English language to the native language (Malay language). This involved clarifying meanings of certain words, and translating words from the Malay language to the English language to help learners search the Internet. As an online motivator, the teacher gave feedback to students while evaluating their work online. Offline motivation was given when the teacher approached each group and discussed or commented on their work. Besides this, the teacher in an online environment also played an important role in promoting cooperative learning among learners. The teacher provided support by building group collegiality, by distributing workload, getting the students to handle logistical problems when using the computer and encouraging students to support each other. In monitoring student progress, the teacher gave advice and assessed student work. Advice came in various forms, such as advising students to attempt a particular task on their own before contacting their peers or geo-experts for help; checking student progress with respect to their tasks and giving advice on how to move on; advising students about intellectual property rights especially in a web environment; advising students to read printed notes when the access time on the Internet was slow; and grading student work online.

Engaging Agent Technology

The study found that teacher support was linked to the enhancement of higher-order thinking skills, information seeking and content skills. However, it was found that a constructivist learning environment presents a challenging and demanding work environment for the lone teacher. By virtue of the fact that each learner and each group is given the opportunity to individualize their own learning, the process-based outcomes are never the same at any given moment. As the teacher moved from group to group, so too did her mental, emotional and intellectual disposition. The teacher had to make an immediate an unconscious shift from the needs, responses and task variables of one group to those of another. In other words, a constructivist learning environment demands that the teacher be able to cater to the multiple outcomes during her interactions for a number of different learning contexts. This consistent shifting or changing of attendant gears for the teacher places a heavy emphasis on the human factor in the teaching-learning process. On the one hand, the teacher had to provide for, respond to and help create a positive learning environment in the classroom. On the other hand, there were some tasks that could have been more predictable i.e. tasks which could be performed by the technology itself. Herein enters the role of intelligent agents, which may allow for offloading of some tasks from the teacher herself.

Hawkins (1994) described intelligent agents as independent computer programs that operate within software environments such as operating systems, databases or computer networks (cited in Baylor, 1999). From an educational point, Seiker (1994) sees intelligent agents as computer programs that are capable of simulating humanlike relationships by aiding the user just like another human would do (cited in Baylor, 1999). Aroyo and Kommers (1999) see agent technology as promising in addressing the challenges of learner directed educational environments which have been designed to harness the information and Internet technologies. In this respect, Baylor (1999) prefers to call the intelligent agent a cognitive tool, which is an intellectual computer device that supports learners' thinking processes. In an educational context, intelligent agents can be created to do the following: a) manage large amounts of information, b) serve as pedagogical experts, and c) create programming environments for the learner (Baylor, 1999). The following section elaborates on two areas of support: managing large amounts of information and providing pedagogical expertise.

Intelligent agent technology has progressed from generic learner support to specific learning support and initiatives taken to create such agents include those by Seiker, (1994), who forwarded COACH, O'Riordan and Griffith, (1999), who created UMAgent and Baylor and Kozbe, (1998), who conceptualized PIM. With such a proliferation of agent technology and the advantages in supporting the teacher, it is timely that such intiatives be

considered for the WebClen. However, for the WebClen, intelligent agents are needed more specifically to help learners to self-assess, get help in translation as well as generate student portfolios, which the teacher can refer to, to keep track of student progress. As an example, the agent can help learners identify errors and suggest alternative strategies in the online activity of gathering information for report writing and writing of critical summaries. Students' answers can be checked against suggested formats, according to each student's ability and progress to the next higher level of learning. Intelligent agent technology can also be incorporated to monitor students working on group projects in an online environment as suggested by Whatley, Staniford, Beer and Scown (1999). The agent can monitor progress made on a collaborative project and suggest ways for improvement as well as how to enhance communication between group members. In the WebClen, two issues that were of concern related to student collaboration with experts were, one, when students copied in verbatim everything that an expert had suggested and, two, when students did not act on suggestions given by the expert. To overcome such weaknesses, agent technology could be created to alert students on the need to paraphrase their answers and probe the learner, alert the expert or supply alternative websites to the learners.

Thus, it can be said that the role of the teacher in a web-based constructivist environment has shifted from that of an information provider to that of a manager of learning. Thus the teacher needs a more efficient support structure to enable the teacher to reach his/her 'zone of proximal support' to manage learners' diverse learning experiences. The power of the computer can be harnessed for this purpose.

Conclusion

This paper has identified the many roles played by the teacher as a manager of learning which inadvertently lead to more demands place on the teacher. The paper also identified how teacher load may be reduced with the incorporation of agent technology. A step forward will be to create these agents and test run them to identify their effectiveness in a web-based constructivist learning environment.

References

Abtar, K (2001). Unpublished doctoral manuscript. The University of Malaya, Kuala Lumpur, Malaysia.

Abtar, K (2000). A Web-based Constructivist Learning Environment for Schools- A Malaysian Model. *Proceedings of the WebNet 2000 World Conference on the WWW and Internet*, pp. 895-898. Also available at http://mdc.um.edu.my/abtar/index.htm

Abtar, K., Mansor, F. & Sapiyan, B. (1999). Design Consideration for an Online Course: A Case Study. *Proceedings of the Pan Commonwealth Forum on Open Learning*, Bandar Seri Begawan, Brunei. [Volume 1: by primary author's surname]

Aroyo, L & Kommers, P. (1999). Intelligent agents for educational computer-aided systems. *Journal of Interactive Learning Research*, 10(3), 235-242.

Baylor, A. (1999) Intelligent agents as cognitive tools for education. *Educational Technology*, 3 (2), 36-40.

Follansbee, S., et al (1996). The Role of Online Communications in Schools: A National Study http://www.cast.org/stsstudy.html

Franklin, S & Peat, M (1998). Online learning. The first year Biology way. [Online]. Available: http://www.ascilite.org.an/conference/wollongong98/ascpapers98.html [2001, March 14].

Freeman, M.A. & capper, J.H (1998). An anonymous asynchronous web-based role play [Online] Available: http://www.ascilite.org.an/conference/wollongong98/ascpapers98.html [2001, March 14].

Hackbarth, S. (1997). Integrating Web-based Learning activities into school curriculums. *Educational Technology* 37 (5), 59-71.

Hewson, L & Hughes, C (1998). Templates for online teaching [Online]. Available: http://www.ascilite.org.an/conference/wollongong98/ascpapers98.html [2001, March 14].

Lyons, d., Hoffman, J., Krajick, J. & Soloway, E. (1997). An investigation of the use of the World Wide Web for online inquiry in a science classroom . [Online]. Available: http://mydl.eecs.umich.edu/papers [2000, February, 30].

Mathew, N & Dohery-Poirer, M (2000). Using the World Wide Web to enhance classroom instruction. [Online] Available: http://www.firstmonday.dk/issues/issue5_3/mathew/index.html [2001, March 24].

O'Riordan, C. and Griffith, J. (1999). A multi-agent system for intelligent online education. *Journal of Interactive Learning Research*, 19 (3), 263-274.

Pitt, T.J. & Stuckman, R.E (1997). The transfer of traditional curriculum to online learning opportunities. [Online]. Available: http://www.coe.uh.edu/insite/elec_pub/HTML1997/de_pitt.htm [2000, February, 30].

Susan, C (1997). Teaching and learning with Internet-bsaed resources. Literacy Leader Fellowship Program Reports, Volume 3, Number 2. (ERIC Document Reproduction Service No. ED 425340)

Vgotsky , L.S.(1978). Mind in society : The development of higher psychological processes. Cambridge : Harvard University Press.

Vullo, R.P. (1993). The Design and Evaluation of a computer based learning environment for secondary students incorporating hypermedia and simulation. Unpublished doctoral dissertation, State University of New York at Buffalo, USA.

Whatley, J., Staniford, G., Beer, M, & Scown, P. (1999). Intelligent agents to support students working in groups online. *Journal of Interactive Learning Research*, 10(3), 361-373.