Virtual Teams in Computing Education

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Abstract

University graduates need to be better prepared to work in globally distributed organizations. Part of that preparation involves teaching students to work effectively in teams to solve problems. Students also must be able to work with individuals located at distant sites where there is no or very little face-to-face interaction.

The goal of this research is to develop a model and a set of evaluation tools that deal with virtual teams. The findings of the study are intended to help educators integrate team projects in distance learning environments. These environments, in many cases, simulate globally distributed organizations. While the research takes place within the context of higher education, the model will apply to any environment that employs virtual teams.

Context

The SCANS report, issued in 1992 by the US Department of Labor described five specific competencies required of the work force in the 21[st]century. The ability to work in teams, as well as the ability to work well with people of culturally diverse backgrounds, were cited as specific abilities in the interpersonal skills area [2].

Colleges and universities have responded to this report and others by integrating collaborative problem-solving throughout the curriculum [3]. There have been efforts to make team projects model "real world"experiences [1] and to form partnerships with industry to give students needed group work experience [7]. The industry-university partnership model is a new teaching/learning pa radigm in the United States. Students learn technical and interpersonal skills from both faculty and industry mentors.

The teaching/learning paradigms discussed above focus on teams in a traditional classroom setting. The teams are composed of students w ho work in face-to-face groups to accomplish a particular task or project. In most instances, the students already know the other members of the group. Some teachers use random selection [6] to assign students to teams while others use student grades or s kills [4]. More recently, in Computer Science, and in Information Systems courses, teachers are relying on Belbin or Myers-Briggs indicators to place students in teams [3]. While there has been increasing interest and research activity in collaborative lea rning and team work in the traditional classroom, very little work has been done on using teams in non-traditional classroom settings.

Distance learning, that is, learning that takes place between remote sites has traditionally been a solitary type of lear ning. Students learned in their own home with very little informal interaction between teacher and student and no or minimal interaction with other students. The use of computer-mediated communication in distance learning has changed that type of learning . Students can now work collaboratively and interact with each other and with their teacher on a regular basis. Students develop interpersonal and communication skills that were unavailable when working in isolation.

Virtual team learning [5] that takes place within the distance learning environment goes further in educating students for work in the 21[st]century. Virtual teams are teams that do not meet face-to-face and use computer-mediated communication. Students can be attending the same university from different geographical locations or be involved in multi-university projects [9]. Students work with students from different cultures to achieve a common goal or accomplish a specific task. In most cases, the students have not known each other previously.

Using teams in a distance learning environment for undergraduates presents some unique challenges for educators. How will teams be assigned? Current group-development models are based on teams that meet face-to-face. Will these same models work in a dif ferent environment?

To successfully incorporate team work in distance learning environments, educators need guidelines on assigning students to teams; creating team building exercises; using appropriate group-development models, monitoring team progress, creating appropriate educational tasks, and designing assessment mechanisms.

Research

This research has two components. In the first component, educators in higher education will be surveyed to determine current practices in assigning teams in distance learning environments.

The objective is to determine which techniques, for example, Myer-Briggs indicators, Belbin indicators, learning styles questionnaires, random selection, are being used to place students in teams. Other information to ascertain incl ude, for example, what type (if any) team building exercises are used, how team progress is monitored, how conflicts are resolved, how peer evaluations are handled, and whether students are provided with background information on working in teams.

The objective of the second component is to develop and evaluate a model and a set of tools for analyzing the performance of virtual teams. As part of this development, the effectiveness of different evaluation tools, such as interviews, surveys, observations, journals, peer evaluation instruments, electronic correspondence, and computer conferencing transcripts will be investigated. How effective is each tool in monitoring group processes in virtual environments? The survey of existing practices may identify ot her tools that should be considered in evaluation.

During Winter 1998, four students from Uppsala University and four students from Grand Valley State University are working together on a programming project. Faculty from Uppsala, Grand Valley, Open Univer sity, and University of Texas are involved in this pilot project. Data gathered from the pilot project will form the basis for developing a model and a set of tools for analyzing the performance of virtual teams in computing education. This model will be tested, refined, and validated with subsequent virtual teams.

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