Walking the Talk: Working on a Faculty Interdisciplinary Team to Develop Internet Workspaces for Student Project Teams

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For years I have been successfully teaching teamwork (team building, planning, managing people, building leadership, resolving conflict), project report writing, and oral presentation skills. Nonetheless, serving on a year-long project team at my institution still taught me valuable lessons about how teams work and how they use technology. This paper describes these lessons and my teaching materials. In doing so, the paper tells the story of two team projects: 1) the team graduation project completed by my students, and 2) the TEK (Technology-enabled Knowledge) Grassroots project I completed with my colleagues to develop better ways to guide these students through their project. The paper begins by providing the background on these two team projects.

Background on the Student Team Project

The Mining and Mineral Exploration Technology Program at the British Columbia Institute of Technology is a full-time, two-year post-secondary program. Graduates work in the engineering, geology, surveying, blasting, environmental, mineral processing and management departments at mines. They work with geology crews in exploration, with engineering consulting companies, in assay labs, and in technical sales and support with companies such as mining-related computer software developers, and blasting and equipment manufacturers. Approximately three-fourths of the students have attended other post-secondary institutions. A number already have undergraduate degrees in fields such as engineering, geography, and computer science. Some students have graduate degrees. A three-year institute survey of program graduates from 2003-2005 indicates that 96 percent of graduates found the program useful for getting a job. Most graduates described the program workload as very heavy.

In the January – May, final term of their graduation year, student teams complete a pre-feasibility study for developing a mineral deposit. As a graduation project, the study requires students to integrate the knowledge they have acquired on deposit geology, exploration methods, resources and reserve estimates, mine planning and design, mineral processing, site layout, environmental reclamation, and project cost estimates and economics. Each team is required to complete a well written and technically accurate project report. Each team also delivers a formal oral presentation to an audience of invited institute faculty and administrators, and representatives of the mining industry, who also serve on the program's advisory committee. The committee's purpose is to help ensure the program remains up-to-date and able to meet employer and student needs in future years. Student project presentations are scheduled to coincide with the program advisory committee's annual meeting.

The students' final-term, 4.5-hour-a-week mining project course teaches them the additional technical skills they need to complete the project and ensures they receive academic credit for their project work. In addition, work related to the project forms 70 percent of their 4.5-hour-a-week communication course for that term. The students also complete a 45-hour introductory communication course in their first term. Both communication courses integrate mining content into standard communication topics such as progress reports, field reports, and proposals. Trade publications, such as *Tracks and Treads* serve as resource material for "industry terminology and actual equipment models/specs" (Dicenzo, 2003, p. 7). The mining project course and the final-term communication course represent about twenty percent of the students' credit hours for their final term. The students are divided by the faculty into teams of four to seven students. The teams are selected to reflect a mix of abilities (Roebuck, 1998) and to match in diversity the groups the students can expect to encounter in their future workplaces (Grant, 2004). In addition, teams are mixed by gender, first language, and temperament. Grouping ESL and non-ESL students produces more inclusive groups (Vance & Fitzpatrick, 2007). To prevent sub-teams from forming, close friends are not placed on the same team (Roebuck, 1998). Because all teams complete their studies on the same mineral property, they all are given access to the same project resources. However, in order to ensure that each team works independently of the other teams, each team's work, including specific questions it may choose to pose to resource professionals, must be kept private from that of other teams. The mineral property exists in British Columbia, although the name of the property is fictional. The information the students are given is based upon an existing industry feasibility study. Students are asked to assume roles in their teams similar to those they would assume if they were completing an actual feasibility study for that property. Typical roles are project geologist, civil engineer, mining engineer, process engineer, and environmental engineer.

Students faced four major challenges in their projects. They needed to integrate information from several disciplines and areas of expertise. They needed to work with peers and accommodate different attitudes and approaches. They needed to access and share a variety of large computer files and paper documents. Finally, they faced competing demands from their other course work, which constituted the remaining eighty percent of their credit hours.

Background on the TEK Grassroots Project

The TEK (technology-enabled knowledge) Initiative is a series of integrated projects designed by my institute to encourage the use of technology by teachers and students. The five-year initiative is led by the institute's IT (Information Technology) Services and Learning and Teaching Centre (LTC). The first projects were completed in the 2005-2006 fiscal year.

In March 2006, at my suggestion, a Mining and Mineral Exploration Technology Program faculty member and I submitted a joint Expression of Interest for a TEK Initiative Grassroots Project. In April, our Expression of Interest reached the second level. We met with an Instructional Development Consultant and a Technical Advisor from the LTC to review our proposal and identify a possible project team. Final selection occurred at the end of May, and our project, "Building Internet Workspaces for Project Teams," was one of only 17 projects across

the institute accepted for the 2006-2007 fiscal year. To implement the project we were awarded 28 days (14 days each), to be taken as release time or as additional paid hours. We were also assigned an LTC Instructional Developmental Consultant to work with us on our project and develop a project plan to provide resources and training for us and for our students. Faculty collaboration and support, as well as adequate training in the technology, have been shown to be critical for successful integration of technology (Rea, Hoger, & Rooney, 1999; White & Myers, 2001). Thus, the teamwork and training to be provided by the TEK project were important features. The LTC consultant assigned to the project managed the project, chaired project meetings, and assembled the project team, inviting additional members as necessary. Thus, the project had a teaching faculty team that consisted of the Mining and Mineral Exploration faculty and me, and a project team, that consisted of the teaching faculty team and the LTC and IT consultants.

The project, "Building Internet Workspaces for Project Teams," was to provide an online community of practice for students to collaborate on their projects, develop their communication skills, and share resources and materials. The project had four phases: Design (September – November 15, 2006), Development (November 15 – December, 2006), Implementation (January – March, 2007), and Showcasing (April – May, 2007). The design phase included IT training of the teaching faculty team. This training included presentation of the available technology and discussion of its suitability for the project. The second major component of the design phase was for the teaching faculty to redesign their existing materials and learning activities to fit the new technology. The development phase included uploading the developed course content into the internet sites and training other faculty in the tools and approaches to be used with the students. The implementation phase was to train the students to use the technology. The final showcasing phase was for sharing and providing feedback on the project. This final phase was to extend past the life of the project.

Faculty faced four major challenges in the TEK project. They needed to integrate information from several disciplines and areas of expertise. They needed to work with peers and accommodate their different attitudes and approaches. They needed to choose appropriate technologies from those available for the project, become proficient in using the technologies, and determine how the features of the technologies could be used to help the students with their projects. Finally, they faced competing demands from other work, since the 14-week project release time represented a little less than ten percent of a full-time faculty workload.

The TEK project was completed successfully, although all four phases involved over 100 emails to schedule meetings and share information, more than 20 hours of 16 meetings, and hours of work that seemed interminable – a January 7th email refers to "finishing off the project," as does a March 7th email. Despite the fiscal year-end in March, the last project meeting was in April.

Revealed in this discussion of the backgrounds of the graduation project completed by my students and the TEK Grassroots project I completed with my colleagues is how remarkably similar the challenges were for both projects. One important similarity is the success of both. All student teams completed their project reports, and their work was remarkably well received by the members of the advisory committee who attended their presentations. The faculty team succeeded in learning and adapting the technology, developing and uploading the curriculum

materials, and training other faculty in the technology that contributed to the students' success. In addition, the faculty team developed new working relationships and a deepened sense of collegiality that have extended well past the life of the project. Additional similarities – and also some important differences between the two projects – will become apparent in a discussion of the phases of the TEK project and of the communication teaching materials.

Design, Development, and Implementation of the TEK Project

At our first TEK project meeting we decided to use WebFiles, an internet-based file management system. We also decided to use Lotus QuickPlace, a web-based workspace, for students to have team discussions, track progress, schedule events, and assign tasks. A major component of the design phase became the faculty training in WebFiles, and most of the project meetings were discussions of how to use this tool for the mining student projects. Our project team consisted of a member of the mining program faculty and myself as project leads, a project manager and instructional designer, a technical writer, a graphic artist, technical advisors, and, later two additional teaching faculty in mining. The diversity of the project team had two important implications for the project: 1) The two project leads were required to explain thoroughly both the student project and our TEK project and 2) I had the opportunity to answer a number of different questions on the projects and listen to a variety of perspectives. In addition, because the technical advisors, who also did the training, were not always available for team meetings, the other team leader and I often had to repeat our explanations during the training sessions. At first, I was impatient with repeating explanations of information that I felt was available in the original project proposal. However, re-explaining the project for different audiences and hearing the project re-explained by the mining faculty widened and deepened my own understanding of the project. The mining faculty likewise benefited from hearing it explained from the point of view of the communication faculty.

I also grew to appreciate the opportunity of listening to the responses of the others in the team. For example, the curriculum designer valued the student project highly because the students were taking on realistic, career-based roles that required them to take on different perspectives and thus to achieve much deeper learning than would have occurred without the project. This response by the curriculum designer to the project reinforced my commitment to a context-specific, discourse-oriented, learner-centred, practical approach to teaching business communication. Listening to the mining faculty member's summary of the project clarified my questions and also gave me useful quotes to use with the students when they asked me about the value of the project. I also learned to appreciate again the differences in presentation styles I had noticed when I first began teaching at an engineering and business institute. For instance, the mining faculty member produced a set of block diagrams that clearly demonstrated the way the student project was organized, the way the files needed to be organized on WebFiles, and the way that WebFiles and QuickPlace were connected, diagrams that he continued to refine throughout the course of the project.

An even more pronounced difference in approach to the TEK project became evident as the mining faculty member proposed instituting a major test procedure to ensure that we understood how WebFiles worked, that it did work, and that we had made wise decisions about how to use WebFiles for the student project. I was impatient with this approach for a number of reasons. It

forced me to spend more time using WebFiles when I would rather have moved on to what I felt was a more important and certainly a more comfortable and rewarding stage: the designing and adapting of my own teaching materials. The test procedure also resulted in a constant re-opening of decisions already made as those decisions were tested and found to be less effective in practice. Finally, for me personally it represented too much of an attempt at control, and the abandonment of the spontaneous, forget-the-rehearsals, let's-take-it-on-the-road-before-a-live-audience approach that I favour. However, a sobering thought was how similar the mining faculty member's approach was to the way, for example, a mining process would be designed: build a model, test the model, make the required modifications, and retest. As the mining faculty member proceeded to download files from last year's student project; assign various roles to different members of the project team, such as that of faculty, outside resource person, and students from different teams; assign us tasks to perform; and then call us to a meeting to discuss the results, I realized that his approach was remarkably similar to the approach the mining faculty and I were using in assigning the student project. I wonder if my impatience and skepticism were also similar to that experienced by the students as they undertook their project.

Another difficulty encountered in the TEK project, one whose positive side was even less apparent, was the turnover of people involved in the project. Over the course of the project we had three different technical advisors. In addition, in January two other mining faculty joined the project. As a result, a number of decisions had to be revisited. The institute was still developing its customization of WebFiles, and more detailed and much improved instructions for its use became available only later in the project. When a decision unraveled as new members of the team suggested better approaches and when better instructions became available that would have made our training easier, I became frustrated and felt I had wasted valuable time. However, I realized that was because I was viewing the TEK project as a product rather than as a process. I had forgotten that part of the improvements in the customization of WebFiles and in the instructions had been instituted because of my team's concerns and questions. For example, we had objected that students would be able to see the faculty member's institute identity number when they logged in, so that was changed in WebFiles.

I also realized that some of our difficulties were inherent in the fact that we were doing practical, not theoretical work. For example, WebFiles is user-based, not project-based at our institute because the institute needs to track individual user accounts, whether student or faculty. As a team we needed to accept and work around that wider institutional requirement and not waste valuable meeting time in regret. At another team meeting when we were wasting considerable time arguing about how to do something in WebFiles, the technical writer suggested we call in the technical advisor rather than discuss endlessly what we did not know – the technical advisor should have been at the meeting but we had a terrible time scheduling meetings when everyone could be available, particularly as team membership expanded. Fortunately, the technical advisor was able to drop by and solve the problem in minutes. Rather, than complain about my wasted time, I decided to use that moment as a valuable lesson that people are less efficient when they are tired and under stress and apt to forget guidelines that they have been taught, such as how to run effective meetings, whether from the front or the sidelines. I reminded myself that working on a team increases the likelihood that someone will remember an important precept and guide the team back onto the right track. I remembered the wisdom of what one of my mining students had told me in class: "Making mistakes is the only way you learn."

The team spent a great deal of time and energy on the important decision of whether to grant students administrative rights over their team folders in WebFiles. The three main advantages of WebFiles for the student project are that 1) files are available over the internet so students can work from their homes or elsewhere on campus, 2) versioning control is possible so that student teams collaborating on a document can keep track of changes made by members of the team, and 3) access control allows one team to keep its documents from being read by another. Access control also allows faculty to post large data and text files of project resources as "read-only" documents that the students are able to read and download but are not able to alter. The mining faculty and I had administrative rights over the project resource files, which would allow us to upload, alter, and delete files and also to decide who would be able to only read or also to alter them. The question was whether the teams should also be given administrative rights over their team files so they could make these same decisions in regard to their files. If teams were given administrative rights, teams could block faculty from viewing their project files. According to the TEK project Expression of Interest, a rationale for the project was that providing an internet workspace for each project team would allow faculty to monitor and guide each team. The technology would create a record of the student learnings. Faculty would be able to access this record in order to monitor, guide, and evaluate the students' work. The metaphor used in the Expression of Interest was that the student project was a banquet and the internet workspace would provide the ingredients, cooking instructions, utensils and the table settings, while the students would prepare, cook, and serve the haute cuisine. Yet, if faculty gave the student teams administrative rights, faculty could be barred from the kitchen and thus would be unable to evaluate the students' cooking skills except as evidenced in the final meal. A major function of the technology was to help faculty track student work, an important one for a communication teacher (Eastman & Swift, 2002; Kaiser, Tullar, & McKowen, 2000). This function could not be exercised if the students could evade tracking. An additional objection focused on the degree to which the institute is responsible for student activities on the internet and thus to which faculty is responsible for monitoring them. However, notwithstanding these arguments, the original model the TEK project team tested, in which student teams were *not* given administrative rights, proved unwieldy in that teams would have to apply to faculty to manage their own team's files and would not be able to use versioning control – the ability to lock a file, prevent access to that file, while one member of the team is working on it, and to produce a clear chronological record of the various changed files. As a file-sharing and collaboration tool, WebFiles is designed to allow users to manage and share files. In order to allow the student teams full use of the tool and thus control over their workspace, faculty needed to limit its use of WebFiles as a tool to monitor and evaluate students. The student project teams needed to be free to distribute administrative rights in their teams. This decision parallels that taken by the institute in regard to student activities on the internet. The institute WebFiles Usage Policy is part of the institute Responsible Use of Information Policy. The policy holds the students responsible for ensuring that Webfiles are used to store institute-related files only and no inappropriate material. Another parallel related to this decision regarding student project autonomy is that of the dual nature of both the student project and TEK project teams.

As discussed earlier in this paper, the dual nature of the TEK project team was that it was composed of the mining faculty member and myself, who first proposed the project, and the team that consisted of us and the various consultants and advisors assembled by the project

manager. Because the mining faculty member and I would be the ones teaching the course, our major goal was to teach that particular course to those particular students. The larger team, on the other hand, was focused on developing uses of technology that could be applied to other courses and other projects across the institute. The mining faculty member and I, whenever possible, met separately immediately before meetings with the larger team. We also exchanged private e-mails confirming our shared understanding of various project issues. We never overtly discussed the reason for these separate meetings and e-mails except for the original suggestion that it would be best to clarify our own needs and concerns before communicating with the larger group. A major implication of this reasoning is that a united front was necessary because the wider interests of the larger group could impede the achieving of our own more focused interest. The student project team also had a dual nature in that it was composed of the students assigned to the team and, as necessary, the faculty and various outside resource people. For example, during their scheduled mining project course time, student teams would meet separately with the mining faculty to report on their progress and to ask questions and voice concerns. They would also meet with outside advisors, for example, an expert from a mining software company. The team of students had as its major goal to produce the project report and oral presentation, whereas the larger team was focused on other goals, such as ensuring the students were applying knowledge from their other coursework, were learning how to learn from outside experts, and were practicing various teamwork and interpersonal skills. The common dual natures of the TEK project team and the student teams suggest that the students may likewise have needed to have a private space under their own control that excluded the larger team. Allowing student teams to manage their WebFiles team workspace thus would have helped meet that need.

For Lotus QuickPlace, which was used for the Mining Project Communication Centre, I, as the communication faculty member, managed the site. Student teams were encouraged to post records of their individual progress for their team to read. Students were also required to submit team progress reports. As site manager, I arranged team spaces and class-wide spaces. I also granted access to faculty to all spaces. I developed two activities for the QuickPlace site. The first activity was for the student QuickPlace training session. Students were required to post an individual message to their team suggesting or confirming the logistics for team meetings, reporting their individual progress to date, giving their personal assessment of the team's progress, identifying any problems and suggesting solutions, assessing their team's effectiveness by specifying one thing the team has done well and one thing the team could do to improve, and suggesting an agenda for the next team meeting. The team was then to collaborate to produce a team document responding to the individual team members' submissions. Students were provided with a rationale and evaluation checklist for the assignment. All information regarding the activity was posted as a WORD attachment in the activities folder of the QuickPlace site. Each student team had its own team area on the QuickPlace site, in which I had placed activity folders for the team members to post their assignments. A second, later activity using QuickPlace was to submit a team progress report. All activity assignments were graded.

Students did not post any other messages except for those required for these two activities. When I asked them where they were posting the almost daily messages that would be required to complete their mining project, they told me that they were using their own e-mails and MSN. They also told me that while they were using WebFiles when necessary to access the project resources, they were using their own WORD files for drafts of their sections of the mining

project report and attaching them to email messages to each other. As in the case of QuickPlace, students completed the required WebFiles activities: they set up team folders for the various sections of the report, and they submitted assignments that were required to be submitted on WebFiles, including the final drafts of their project report and oral presentations. However, they claimed that, as in the case of QuickPlace, they were using their own system for their student projects, a parallel system to the technology tools that the TEK project had developed for them. This student preference for using their own system except when required to use WebFiles and QuickPlace parallels TEK project team behaviour. The TEK project team communicated exclusively through the institute E-mail system. The team did not develop a CoP for the site. While all team members were issued user accounts in WebFiles, these were used to implement the WebFiles simulation test procedures and not to distribute files on the TEK project or to produce a TEK team project report. Instead, for all communications associated with the TEK project we used our usual channels, with which we were more comfortable. The TEK project team rationale for our technology use appeared remarkably similar to that provided by the student project team. Nor is the students' behaviour unusual in projects using technology: Zhu, Gareis, Bazzoni and Rolland report that students in their project frequently used their personal e-mail even though it meant leaving the Blackboard group environment they had constructed for the students (2005).

Communication Teaching Materials on Teamwork and the Project Report

TEK project team experiences also influenced my development of the communication course materials for the student project. Three folders were created in the read-only Project Resources folder to reflect the student project topics covered by the communication course: Report Format and Style, Project Planning, and Teamwork. These appeared in the same listing as the other student project resource folders such as Civil, Costing and Cashflow, Processing, and Environmental, so that the students would realize that their communication skills were directly related to the other more apparently mining-related project resources. Because of its ability to handle large files, WebFiles was ideal for uploading PowerPoint slide shows. Earlier Mining student feedback had indicated that they really liked the use of visuals because they found they "really help with understanding [the] topic." Because research indicates that teachers may overestimate the value of PowerPoint for helping students learn, I tried to offset this by using the slides to enhance interactions with students (James, Burke, & Hutchins, 2006). In addition, PowerPoint allowed me to modify slides quickly and easily according to student input in class. I added comments and even scanned documents from the students. Students also reported that they found that PowerPoint slides allowed them to absorb the material in succinct, useable chunks.

The communication course materials related to the student project were organized as training packages in order that their communication class time would more resemble a training workshop, the kind of "class time" they would experience in industry. The five packages, which complement the students' teamwork manual, *Teams That Work* (Harley, & Robson, April 1998), are as follows:

Training Package 1: Making Better Team Decisions.

This package had two parts, Part 1: Participate in a crash-survival simulation and Part 2: Discover your personality profile. Part 1, which takes 120 minutes, consists of an introduction giving the rationale and objectives for the exercise; a simulation involving a plane crash at an abandoned mine site and the need to prioritize a list of items for the group's survival; and a debriefing in which students reflect on what would have happened had they followed a five-step problem-solving process. For Part 2, which takes 50 minutes, students take personality tests and develop profiles of the members of their teams. The test results provide the students with a common way to describe and thus to compare themselves without labeling some traits as "good" and others as "bad." The students do not have to accept the validity of the personality test or the relevance of its results. They merely have to use it as a basis for reflecting on themselves in regard to the personality categories measured. The goal of Part 2 is to teach the students to use personality differences in a team as a source of strength and to encourage participation of all team members in decision making. Students learn how to identify and encourage behaviours that help a team. They also learn how to respond to behaviours that are troublesome in teams. At the end of training package 1, students complete a graded, written assignment in which they reflect on what they have learned and discuss how they can use it to complete their mining project successfully.

Training Package 2: Planning a Project.

Students learn how to follow a seven-step method for planning a large team project. They learn how to complete a project schedule and a team charter that sets the ground rules for their teams. Each student team also completes a force-field analysis to identify and compare the forces or factors that support or work against the successful completion of their project. They identify these resisting and driving forces, characterize them according to their relative strength or weakness, and then brainstorm ways to reinforce the positive factors and eliminate or reduce the negative ones. Each student team also completes a graded project plan.

Training Package 3: Collaborating on a Written Report.

Students examine sample reports in mining to learn about the format and style of a formal written report in their field. They learn about the specific challenges posed by the team project report. Related to this package is a slide show on how to write a technical description including how to describe a property.

Training Package 4: Resolving Conflicts in Teams.

Students take a conflict management style survey, participate in a simulation, learn to identify and resolve the most common types of conflicts that occur in teams, and learn the stages of team development. Students complete a graded reflection on what they have learned about conflict resolution and how to apply it in their teams and in the workplace. They also complete an exercise on listening skills, a problem area that has been shown to pose a challenge for students working in groups online and face-to-face (Scalia & Sackmary, 1996).

Training Package 5: Team Oral Presentations.

Students review what they have learned about individual oral presentations and examine the differences between individual and team presentations. Students respond to a record of past audiences' comments on mining project presentations, critique sample slides, and deliver practice and graded individual and team presentations.

The most important lesson I learned from the TEK project that influenced the development of the teaching materials described is that project work is hard work, and project management and communication skills are critical. Just as I worked extra hard in an attempt to perfect teaching materials that would be appearing in a shared space that my colleagues as well as students could access, I also seasoned them with real-life examples from my own TEK project team meetings.

The most important lesson I learned from the student project that promises to change my understanding of education and technology is that it is no longer enough to realize that students bring with them varying levels of technological literacy (Rea, Hoger, & Rooney, 1999). When the students' activities are initiated by a problem or project, they will use the various tools and resources at their disposal to support their problem-solving processes (Dalsgaard, 2006), whether these tools are authorized or not. Likewise, faculty members in the face of a "loss of control in the development and delivery process and even their own content and teaching materials" (Sammons & Ruth, 2007) will engage in their own problem-solving activities as they experience a tension between the students as independent learners and their need to monitor, evaluate, and control learning (Sims, 2006). The positive outcome, for me, was the developing of new interdependent relationships among teaching faculty, students, and technology teams.

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Acknowledgement to my project partner, Jim Leader, ACSM P. Eng, BCIT Mining faculty; Terry Fuller, BCIT Instructional Development Consultant; and the BCIT TEK Initiative for providing funding for the project.

Biography

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