# Virtual Learning Environment: Preparing for the Knowledge Age Work in the 21st Century

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The globally available information technologies (IT) have an extraordinary potential to transform the educational process in the 21st century. The new educational environment created by the IT infrastructure is envisioned to be characterized in the future by virtual learning spaces, lifelong learning, just-in-time education, global collaboration between students and faculty, simulated environments, electronic books, digital libraries and virtual universities with global presence (Hamalainen et al., 1996; Ives and Jarvenpaa, 1996; Scardamalia and Bereiter 1993). The Virtual Learning Environment (VLE) project described in this paper attempts to realize a part of this vision by redrawing the physical boundaries of a classroom, enabling more and different types of teamwork, and by allowing learning to be a continuous, time-independent process utilizing electronic media and electronic resources. In addition, as the Internet and especially the World Wide Web (WWW) also promise to revolutionize the dynamics of commerce, the VLE is intended to provide business students with an opportunity to develop a cursory understanding of the e-commerce dynamics and the entrepreneurial opportunities of the electronic marketplace.

This article summarizes our experiences and the results of the VLE project. For a more detailed description, please refer to Lobert Jones et al. (1998).

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## Virtual Learning Environment: Motivation, Goals, and Resources

The VLE is a graduate business project which allows teams of geographically dispersed students to work together on a development of a business plan for an innovative, web-based company. It uses a web-based courseware that consists of approximately 20 pages of resources focused on virtual team interaction and electronic commerce. The project has been built based on the premises of effective *learning models*. It sets appropriate educational *goals* for the students and provides them with helpful web-based *resources*. We discuss the above mentioned aspects of the project below.

### Learning Models

The emphasis in the U.S. education is slowly changing from teaching to learning, where students no longer are required to just memorize the facts distributed to them

by the instructors, but they are expected to go beyond and find whatever information is necessary to solve problems. To respond to this trend, the VLE project is based on the *constructivist theory* of learning and its variant—the *collaborative model*.

The learners are presented with a set of Internet-based resources that are available on-line, any time and any place, and they can explore the topic on their own, as well as together with their teammates. The assigned topic material is presented in a hypermedia environment, which facilitates exploration of the factual information and the discovery of the relationships in the domain of study. By working in teams, students have the opportunity to share their understanding of concepts and receive diverse, multiple feedback prior to the feedback received from the professor (Wheeler and Wu, 1996). This particular structure of the learning environment is believed to best facilitate the achievement of the project goals, which we describe below.

### Project Educational Goals

In order to respond to the current trends in the Knowledge Age business environment—a move toward virtual structures, electronic commerce and virtual learning spaces—the VLE sets out to accomplish the following goals: (1) to develop an appreciation of virtual team interaction through hands-on experience, (2) to foster critical / integrative knowledge building in the area of electronic commerce, (3) to promote active learning in a hypermedia environment, and (4) to encourage development of business skills relevant to students' future careers: IT, electronic communication and collaboration, and creativity.

### Project Resources

In order to assist the students with the enhancement of skills and the accomplishment of the project's educational goals, the VLE offers several resources that can be categorized as follows: logistics support, team process support and task-related support.

The VLE offers *logistics* support through a number of pages that assist the students and the coordinating faculty with the organization and the management of the project. These logistics resources range from a project description page, where VLE's goals and the deliverables are described; through a project evaluation criteria page and a page that offers a mechanism for finding the names, e-mail and URLs of student teammates; to a page presenting an opportunity for a virtual visit with project faculty or a short virtual tour of the university campuses from which the students originate.

To support the virtual *team process*, we developed several resource pages and we made available to the students a number of tools. A weekly "Calendar of Events" page specifies in detail what is to be accomplished by the students each week. These activities range from group development and "getting to know you" exercises, including a personality type profile test, a personal e-mail exchange, a virtual visit of teammates' campuses and an online chat, through a structured electronic commerce exploration, team brainstorming, and group process contract, to business plan development and the installation of the web presentation pages. A "Tool Box" page specifies all the tools available to the students and how / why to use them: e-mail, e-mail discussion list, web-based discussion forum, chat lines, videoconferencing (optional), group support tools, HTML resources, search engines, and a "creativity gym," where students can stretch their imaginative muscles in a creativity exercise or relax in a "Café." There is also a page with practical "Words of Wisdom on Virtual Team Process" offering students advice on effective virtual socialization and collaboration skills, nettiquette, generating participation, keeping the team on task, making group writing a success and effective videoconferencing.

The *task-related* resources include information that enable the students to learn about electronic commerce and develop a short business plan for a web-based venture. A "Grab-bag of E-Comm Resources" page provides links to numerous electronic commerce resources such as articles, cases, an introductory lecture on electronic commerce, electronic commerce knowledge repositories, several good starting points for web exploration, links to business web directories, sample web-based businesses, and the design and implementation of a corporate web site. Other task-related resources include pages with a sample business plan template and a page offering advice on writing an effective business plan.

When combined together, the logistics, team process, and task-related resources enable the students to familiarize themselves with the basic concepts of electronic commerce, to work in virtual teams on an unstructured task, and to collaborate on the development of deliverables requiring creativity. The richness of these resources, the variety of tools, media, and information, is one of the aspects that make the VLE unique. In addition to the richness of tools and compactly organized resources, the structure and the design of the VLE make it attractive for adoption as a course project.

## VLE Project Design

The VLE was conceived, developed, and organized by an MIS faculty in a private, Southwestern university during the Fall 1995 semester. We used the project during the Spring 1996 semester as a course project in a number of graduate, mostly business, programs. There were over 200 student participants from nine schools on three continents. The students ranged in age from 22 to 48 and were enrolled in strategy, marketing, organizational behavior, or information systems courses. Aside from the universities in the U.S., there were two universities in Canada, one in Australia, and one in Portugal. The students were divided into 45 teams of four to six students each. The teams were designed to include two to three pairs of students from different universities in order to incorporate collocated partners and dispersed ones. This design mirrors the real-world virtual teams, which normally include a mix of collocated and dispersed relationships, and it gives the students an opportunity to better manage the challenges of the virtual relationships.

The VLE courseware was designed, based on complementarity theory and the conceptual framework for designing collaboratories (Barua et al., 1995) in order to maximize information access and interaction richness as well as to minimize the interaction / information costs. Because this approach to organizing information and interaction is so natural, compact, and easy to use, the students can be effective learners in the domain of virtual interactions. This has been our experience, as evidenced below.

## VLE Results

To test whether the project indeed proceeded as intended, we collected qualitative and quantitative data from multiple sources. Upon completion of the project, we surveyed the students via the WWW. Seventy-three of them filled out the survey. Each team also turned in at least one copy of their e-mail and chat room traffic on disk and/or on paper. Additionally, numerous students wrote narratives about their experiences.

To test whether the project was actually completed in virtual teams, we measured the intensity and quality of virtual teams' interactions. Overall, the project can be considered a success in terms of *intensity of virtual teams' interactions*. The participants in the project had a number of possible methods of communicating with one another and we found that except for a couple of groups, all teams were able to establish a good communication channel. The virtual teams exchanged between 60 and 220 messages during a six-week period, with over 20 messages sent and received by each team member. On average, they had over an hour of web-based chatting, and about half an hour of groupware tools usage. One hundred and twenty students subscribed to the listserv, and there were approximately 30 messages with general questions and helpful comments regarding the project posted to the VLE community during a six-week period. Students used also a fax machine and phone as well as meetings with their collocated partners to accomplish the project. The greatest amount of contact was occasioned by face-to-face meetings with collocated partners, followed by e-mail.

The *quality of the virtual teams' interactions* is evidenced by the following student observations:

> The VLE project that I undertook was a great experience. I learned a great deal about group communications and people interactions through the project. . . . The new dimensions of organizational behavior in the virtual world was explored during the VLE . . . .
>
> [VLE] brought into play the importance of communications and active listening, the role of leadership and group dynamics, and the impact of intergroup relations and conflict. VLE helped me realize the role conflict plays in generating creativity.
>
> I experienced a lot of ups and downs with the project and teammates. Overall, I believe I can now handle such projects better in the future.

Consistent with the literature on collaborative learning, the learning of electronic commerce and IT was measured using the following variables: learning achievement, satisfaction with the process, satisfaction with the outcome, and overall satisfaction.

The VLE was effective in enhancing student *IT skills*, as evidenced by the comments below:

> [VLE] exposed me to concepts and computer skills that will undoubtedly find use as I pursue my career. . . . I would have never explored some of the computer skills that I used in this project, simply because of fear of not knowing. This gave me a chance to feel confident and to excel to the next step.
>
> The VLE was a fantastic experience. I became quite adapted to computers and felt privileged to be one of the pioneers of such projects.

Also, since less than 10% of all the participating students had prior experience with application development for the web, the fact that over 70% of all the groups developed web sites to install their company business plans and/or their business presentations can be considered a success with regard to learning new IT skills. On average, each site contained over five pages of company-relevant information and graphics.

The goal of *fostering knowledge building in the area of electronic commerce* through the VLE was also achieved. Over 85% of all the teams showed knowledge of web-based electronic commerce in their business plans which can be regarded as a success. Seventy-five percent of the teams displayed knowledge of their web-based competition and 60% developed truly innovative idea for a web-based venture. Examples of the latter include: heroes baseball fantasy camp, international antique network, Asia Watch—an investment service, and online biking adventure. It should be noted that the notion of web-based electronic commerce was totally new to all the students participating in the project.

*Process, outcome, and overall satisfaction* with the VLE was also high. The students were positively oriented towards their teams and the VLE. A majority felt that the teams had worked well (process satisfaction), that choosing member roles was easy, that all members did their best, and that they were proud of their plan (outcome satisfaction). This would indicate that virtual teams can produce beneficial team results and hence that the use of virtual teams in teaching situations can enhance the learning experience even though some of the members do not come into face-to-face contact with one another. This view is further supported by the fact that a predominance of respondents also felt that they would prefer to work in virtual teams rather than alone. Although students enjoyed the VLE and the virtual process, they perceived the virtual teams to be inefficient. However, the lack of efficiency did not detract from the overall team satisfaction. The reason for it may be that, overall, in students' opinion the project went better than expected.

The *overall student satisfaction* with the VLE is also evidenced by the following student comments:

> VLE project was great! I think it should be mandatory at some time in the MBA programs.
>
> Although I did not receive the best grade on the assignment, I feel that the experience as a whole was worthwhile. If I had a chance to be involved with a virtual project again, I would jump at the opportunity.
>
> This was an excellent experience—so much learning occurred that it is immeasurable.

In summary, based on the student perceptions, their performance and satisfaction, and the external interest in the project, the VLE proved to be an effective approach to prepare students for the realities of the virtual organizational forms, electronic commerce and virtual learning spaces of the 21st century.

## VLE Transferablility

It should be noted that the instructional approach of the VLE is fully transferable to other university institutions and adoptable in many graduate business courses. In order to implement the VLE at other schools, the students only need to have access to e-mail and web browsers. Additionally, one of the organizing faculty should have access to a web server in order to install the project courseware. The

project courseware is available from the author (contact b.jones@tcu.edu) and can be downloaded for free by any educational institution interested in adopting it.

The software must be somewhat customized to reflect the information relevant to the collaborating parties, that is, the students, faculty, campus information and detailed deadlines. Customization is minimal and easy to do as each page requiring customization has appropriate step-by-step instructions included. To facilitate finding virtual partners several resources can be utilized on the web: Storefront for Virtual Partners, Global SchoolNet Internet Project Registry and calls for partners can be issued on the relevant listservs, as done in the original project implementation.

The VLE project increases international content in the curriculum and has a potential for developing professional relationships with colleagues around the globe. The lack of significant differences in the results between schools suggests that the approach is versatile enough to be used in a wide variety of business courses and across different universities.

## References


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## NAMES IN THE NEWS

**CAROL LATTA, Feature Editor, Home Office, Georgia State University**

**Gary Klein** has been named the first Couger Professor of Information Systems in the College of Business and Administration at the University of Colorado at Colorado Springs, where he joins a quality program in IS. He was previously on the faculty at the University of Arizona, Southern Methodist University and Louisiana Tech University and served as dean of the School of Business at the University of Texas of the Permian Basin. His specialties include information system development and mathematical modeling, with over 50 academic publications in these areas. He is the current coordinator of DSI Job Placement Services.

**J. P. Shim**, Mississippi State University, was invited to the International Conference on Conceptual Modeling (workshop on Internet and DB) from November 15-20, 1998, in Singapore. He was one of selected U.S. delegates (NSF funded) to discuss current computer science and MIS research issues.

**Merrill Warkentin** has been appointed to the editorial review board of the *Information Resources Management Journal*. He has also just been appointed as the new MIS area coordinator at Northeastern University in Boston. He is completing a research project funded by the GE Fund and is engaged in the third stage of his research in CMCS and virtual team design, which was recently published in the *Decision Sciences Journal*. He was this year's program chair for the National IRMA Conference, and was the DSS track chair at the National DSI Conference in Las Vegas.

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